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Joint Line Working

It is officially announced that, from October 1 next, the Midland & Great Northern and the Norfolk & Suffolk Joint Railways are to be worked by the L.N.E.R. This arrangement (to which we refer on page 104) marks the second important change in joint line operation to be made since grouping under the Railways Act of 1921, which, it will be recalled, left unchanged the position of joint railways excepting insofar as all their owning partners became merged into one group company. The three major joint systems which thus retained their separate management were the Cheshire Lines, the Somerset & Dorset, and the M. & G.N. The first to be subjected to any change was the Somerset & Dorset, which, at grouping was owned by a separate company but was leased jointly for 999 years from 1875 to the Midland and L.S.W. Railways. Then, under the provisions of the Southern Railway Act, 1923, the undertaking was vested "jointly and in equal undivided moieties" in the L.M.S.R. and Southern Railway, and it was specified that both companies were to have "equal rights each with the other in all respects as to the working and using of the undertaking." As from June 1, 1930, however, the Somerset & Dorset Joint Railway ceased to be worked as a separate concern, and the operating and commercial duties were taken over by the L.M.S.R., while the Southern Railway assumed respon-

sibility for maintenance of way and works. The L.M.S.R. took over all the locomotives but the carriages and wagons were apportioned between the Southern and L.M.S. Railways. Now that the M. & G.N. is to lose its operating identity, there will remain only the C.L.C. as a separately-worked joint unit.

* * * *

Railway Wages

Public interest has been focussed this week on a room in Whitehall, where the Railway Staff National Tribunal is hearing the claims of the National Union of Railwaymen and the Railway Clerks' Association for the discontinuance of the relief afforded to the railway companies by Decision No. 119 issued by the National Wages Board in March, 1931. In another column our contributor on railway staff and labour matters outlines the first day's proceedings of the tribunal; the fact that these proceedings have attracted much attention is not surprising, for they affect directly the earnings of some four hundred thousand railway employees, and the sum involved in the claims is not far short of three million pounds. The tribunal is presided over by a chairman whose career has been characterised by wide experience in many spheres, and he and his two colleagues are expected to show a clear understanding of the problems underlying the issues which they are called upon to decide. That the cases will be capably presented to the tribunal by the three advocates we have not the least doubt, but a novel feature of these proceedings is that, present with the members of the tribunal, are representatives of the parties who, in the rôle of assessors will assist the tribunal in the elucidation of matters of fact, but will not be called upon to sign the decision.

* * * *

The Week's Traffics

Traffics of the four group companies for the past week look disappointing, but they compare with substantial increases in the corresponding week of 1935. The heavy decreases in passenger train traffics of the L.M.S.R. and L.N.E.R. for the past week may be partly accounted for by the fact that they do not include the Glasgow fair holiday receipts which were in the figures for the corresponding week of 1935. Merchandise increases of the L.M.S.R. and L.N.E.R. for the past week are on top of satisfactory gains a year ago. For the 28 weeks of the current year the aggregate receipts of the four companies together amount to £80,193,000, an increase of £2,040,000, or 2.61 per cent.

	28th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	%
L.M.S.R. ..	55,000	23,000	30,000	2,000	1,054,000	+ 3.33
L.N.E.R. ..	16,000	8,000	28,000	20,000	614,000	+ 2.66
G.W.R. ..	6,000	1,000	3,000	10,000	265,000	+ 2.03
S.R. ..	3,000	500	1,500	2,000	107,000	+ 1.03

Mersey Railway traffics for the year to date show an increase of £1,067. The Great Northern Railway (Ireland) records an aggregate advance of £15,250, and the Great Southern Railways have one of £74,246.

* * * *

Anglo-Argentine Tramways

In the City of Buenos Aires the chaotic and increasing competition of road motor vehicles between themselves as well as with the subways and tramways has made the traffic position there notorious, and it will remain so until the Senate approves the co-ordination of transport Bill which was passed in September last with a clear majority by the Argentine Chamber of Deputies. One of the chief sufferers from this competition and from exchange difficulties is the Anglo-Argentine Tramways Company, which had a deficit of £40,249 for the

year 1935. This was in spite of the numerous improvements effected in the public interest which resulted in the carrying of 8,787,137 more passengers than in the previous year. Schedule speeds were increased on a number of lines; the runnings of sixteen other routes were either modified or extended; the combination tickets with the underground system, hitherto limited to certain feeder lines were largely extended, and workmen's services were established on three other lines. Other measures adopted were a reduction of fares on the line to Quilmes, the intensification and prolongation of the underground services during the night-hours, the strengthening of the rolling stock breakdown services in order to cut down delays caused by breakdowns on the company's tracks, both of its own cars and other vehicles, and the re-organisation of the traffic departments in order to obtain a better control of the services. On the surface lines the increase in car-kilometrage was 6.85 per cent. and on the subway 3.69 per cent.

* * * *

Overseas Railway Traffics

Argentine railways ended the financial year to June 30 with decreased traffic receipts except on the Buenos Ayres & Pacific, the Argentine North Eastern, and the Cordoba Central, and the returns for the new financial year do not look encouraging either in terms of currency or of sterling. It must be borne in mind, however, that the aggregate returns from July 1 cover two days less this year than last. For the 28 weeks of the current year the Leopoldina Railway shows an increase in sterling of £39,472, but the Great Western of Brazil is still £6,200 down notwithstanding a currency increase of 1,924 contos. The San Paulo is £157,001 up for the 27 weeks.

	No. of Weekly Week Traffics	Inc. or Decrease £	Aggregate Traffic £	Inc. or Decrease £
Buenos Ayres & Pacific ..	2nd 71,827	- 852	114,856	- 27,664
Buenos Ayres Great Southern ..	2nd 105,269	- 2,957	163,186	- 46,977
Buenos Ayres Western ..	2nd 38,173	- 5,364	57,681	- 23,363
Central Argentine ..	2nd 129,382	+ 4,253	189,010	+ 48,462
Canadian Pacific ..	27th 546,200	+ 58,400	12,955,200	+ 1,161,600
Bombay, Baroda & Central India	14th 195,375	+ 6,450	2,539,800	+ 159,375

The Canadian Pacific during the past fortnight has increased its gross traffic receipts by £141,000.

* * * *

Egyptian Delta Light Railways

Increasing competition from outside motorbuses and taxicabs necessitated further reductions in fares in order to retain traffic on the Egyptian Delta Light Railways during the year ended March 31, 1936, and this resulted in a decrease of £13,489 in coaching receipts. Goods traffic receipts remained much the same as in the previous year, notwithstanding a decrease of 11,071 tons. During the year under review motorbus services were inaugurated on selected high roads under temporary licences from the Egyptian Government, and 46 buses were in operation at March 31.

	1935-36	1934-35
Passengers ..	11,976,481	11,393,611
Goods, tons ..	590,828	601,899
Average miles ..	622	622
Operating ratio, per cent. ..	81.71	77.26
Coaching receipts ..	137,121	150,610
Goods traffic receipts ..	85,457	85,484
Gross receipts ..	226,789	240,431
Working expenses ..	185,313	185,751
Net receipts ..	41,476	54,680

The company has applied to the Egyptian Government for a concession for running motorbuses over roads parallel with its lines. Every effort is being made to balance the extra expenditure on bus services by the elimination of unremunerative trains.

Bombay, Baroda & Central India Railway

An improvement in gross earnings for the year ended March 31, 1936, was supplemented by a reduction in expenditure, and net earnings advanced by Rs. 35,53,515, or 7.62 per cent. in comparison with the previous year. Except for minor adjustments there was no alteration during the year under review in the mileage worked by the company, which was 2,989 miles for the Government of India and 702½ miles for Indian States or other companies. Since the close of the financial year, however, the working of the Jaipur State Railway of 180 miles, hitherto operated by the company, has been taken over by that State. It is expected that the extension of the existing electrified suburban section between Bombay and Borivli for an additional sixteen miles to Virar will be completed by August. Both coaching and goods traffics of the combined system worked for the Government of India showed an improvement on the whole, the advance on the coaching side being mainly in third class passengers and season tickets. The increase in goods was chiefly in general merchandise. Job analysis accounted for part of the savings in expenditure, but against that must be set the increases due to the removal of the percentage cut in salaries and wages from April 1, 1935. Surplus profits brought in £9,169 more, but the total distribution for the year to stockholders remains at 6 per cent., the same as for the past fifteen years.

* * * *

Railway Air Services

Sir Harold Hartley, Chairman of Railway Air Services Limited, speaking at the annual general meeting of the company this week, confirmed the view often expressed in these columns when he said that "owing to the comparatively short distances to be traversed, to the excellent system of surface communications, and the time lost in transit between aerodromes and the city centres, air transport is unable, at present cruising speeds, on most trunk routes in Great Britain to show a marked superiority in speed over surface transport unless a water crossing is involved." The success of the Railway Air Services has been dependent mainly upon the careful observation of this factor when selecting flying routes. Nevertheless it has been necessary for comparatively substantial subsidies to be provided by the railway companies. Other operators have apparently managed to maintain individual services over isolated selected routes with a fair measure of success, but it has yet to be proved that a comprehensive co-ordinated network of routes can be operated without involving a loss. However, we do not suggest that Railway Air Services is pioneering in a barren venture, for it must not be forgotten that the European and Empire systems of airways deprived of subsidies would probably soon cease to exist.

* * * *

437 Miles on a Stretcher

An unusual piece of ambulance work has just been carried out with the aid of the G.W.R. and L.N.E.R. It was desired to remove a Dutch seaman, suffering from a fractured pelvis, from a Fowey hospital to Flushing, but essential that he should not be moved from the stretcher throughout the journey. The ordinary hospital stretcher, which is too wide to pass through the carriage doors, could not, therefore, be used, so the G.W.R. arranged for a Parratt stretcher, the invention of one of its Taunton carriage cleaners, to be placed at the disposal of the hospital authorities. This apparatus, which was illustrated in our issue of June 20, 1934, can be lifted in or out of a compartment from or to the platform or

ambulance. Moreover, it can be fitted to any ordinary stretcher and has handles that slide in flush with the ends, enabling it to be manoeuvred in confined spaces or to negotiate passage corners. The patient was conveyed by night train from Fowey to Paddington, driven by ambulance to Liverpool Street station, taken by boat train to Harwich, and then placed on the L.N.E.R. steamer. He arrived at Flushing 19 hours after his departure, having made the 437-mile rail, motor, and steamer journey without being moved from the stretcher. This is the first time a Parratt type of stretcher has been used for a journey outside this country, but so satisfactory have they proved, especially in cases of paralysis, broken limbs, and severe surgical operations where it is imperative for the invalid to remain flat, that they have now been made available by the G.W.R. at Paddington, Bristol, Exeter, Plymouth, Gloucester, Cardiff, Swansea, Birmingham, and Chester and other points throughout the system, from which they may be obtained immediately by any G.W.R. station.

* * * *

L.M.S.R. Time Recovery

Train crews and station staffs both contributed to some noteworthy achievements in time recovery recorded in the July issue of *On Time*, the journal of the L.M.S.R. Operating Department. A recent punctual arrival in Euston by the 8.15 a.m. up Liverpool express—on this occasion a 17-coach train weighing 508 tons—was attained through the saving of ten minutes by the engine between Crewe and London, and of one minute by the staff at Bletchley station (the only intermediate stop, and allowed two minutes in the public timetables). Crewe and Carlisle between them contributed three minutes to twenty-nine minutes regained by the down Royal Scot between Stafford and Glasgow, giving an arrival two minutes early in spite of the 27-min. late departure from Stafford occasioned by a blockage of the down line between Tamworth and Lichfield. In both cases the engines concerned were Stanier Pacifics. Leicester station, on a late arrival of the 12.10 p.m. expresses from Glasgow, sent the train away in three minutes instead of the allotted five, and six more minutes were gained by the engine *en route* to St. Pancras. On the Central Division, mention is made of eleven minutes regained by one of the Manchester-Blackpool club trains, eight minutes going to the credit of the engine, and three minutes to the station staff at Preston.

* * * *

Turkish Railway Construction

New railway construction in Asia was again actively pursued by the Turkish State Railways in 1935, and the Turkish Minister of Public Works recently outlined the plans for the near future which indicate that it will be many years before the extensive scheme the Government has in view is brought to fruition. The technical work in connection with new lines in recent years has been entrusted to the so-called Swedish Group, a consortium composed of the Swedish firm of Nydquist & Holm and several Danish concerns, which has likewise supplied a large proportion of the materials and equipment required. This combine has now finished its contracts, and the Turkish Government is itself doing the work through a special department attached to the State Railways Administration. According to a recent issue of *Zeitung des Vereins*, the Swedo-Danish concern has constructed altogether 840 km. (512 miles) of line in Turkey, and received 840 million gold dollars, or about 210 million gold francs, from the Government. As a comparison it may be mentioned that the banking combine which, before the war, financed the construction of the

Baghdad Railway under the auspices of the Deutsche Bank, received for doing approximately the same work as the Swedish combine 227 million gold francs in 4 per cent. Government bonds. From now onwards the Turkish Government intends to obtain the necessary money for new lines by internal loan, to be raised as the work demands, and the money market is favourable. It is hoped to build at less cost this way than by having recourse to foreign credit. Recent railway developments in Asiatic Turkey and brief details of the work now being undertaken are outlined in a news article on page 118.

* * * *

Arc-Welded Rail Joints

Although it is in many ways desirable that the length of rails should be increased, in order to reduce rail-joint maintenance and to improve the running of vehicles, the way of approach to increased length raises certain serious problems. The greatest length of rail which up to the present has been produced as a commercial proposition at rail mills has been 90 ft. in this country, and 30 m. (98 ft. 5 in.) on the Continent. Much greater lengths have been welded at depots and transported to the site, such as 90 m. (295 ft. 3 in.) lengths in Germany, produced by welding together three 30 m. rails, and the even greater lengths on the Delaware & Hudson Railroad of the U.S.A. described in our issue of March 6; but the problem of welding existing rails in the track is one for careful consideration. On page 105 of this issue we publish an article giving in detail the experience on Hungarian railways of arc-welding, which is favoured on grounds of both efficiency and economy. An essential feature of the type of arc-welded joint used is a fish-plate of mild steel, shrunk by cooling on to the feet of the two rails at the joint, and then welded at the edges, coupled with the arc-welding together of the two rail-heads. This type of track can be produced in 100 m. lengths at a cost barely in excess of ordinary track with four-bolt fishplates.

* * * *

Flexibility of the Steam Locomotive

In the paper entitled "Power Plant on Wheels" which he read at New York recently, Mr. A. Lipetz, Chief Consulting Engineer of the American Locomotive Company, referred to a peculiarity of the steam locomotive which is probably its greatest advantage, namely flexibility. Its tractive-effort-speed curve is exactly what it should be for railway work, having a large value at low speeds, which is good for starting heavy trains, and a sloping line at higher speeds, corresponding to the increasing power curve required for acceleration and overcoming the train resistance (which also increases with the speed). This characteristic, derived from the expansive properties of steam, and from direct drive, makes the steam locomotive invulnerable against the progress of time and competing power. About 30 years ago, when electric locomotives made their first appearance, it was thought by some that the steam locomotive was doomed to extinction. Electrification acted only as a spur, and an epoch of new improvements and refinement in design began which resulted in steam locomotives being built to develop up to 5,000 h.p., and for speeds of approximately 100 m.p.h. It must also be remembered that the steam locomotive can burn the cheapest fuel, can be built of relatively cheap materials and is simple in operation. Although it is subjected to all kinds of bumps and jerks, to the effects of bad weather, sand and grit, dust and dirt, and to more or less continuous working, it gives good results all round in everyday service.

Colonel Mount's Annual Report

AFTER any railway accident of consequence the travelling public is reassured by the popular press with the comforting reflection that in no other country are such elaborate safety measures taken for their protection as in this—an assurance to which support is given by the Annual Reports of the Chief Inspecting Officer of Railways which, year by year, present carefully tabulated figures recording the results of these precautions. While far from believing that there is nothing in regard to railway safety we in Great Britain can learn from abroad, we are pleased to observe that Colonel Mount's report for 1935 bears renewed witness to the care with which our railway traffic is being conducted, notwithstanding the tendency to higher speeds, increasing train mileage and inadequate financial income. It is safe to say that if a decline in safety were to set in—even from some unlucky combination of causes unlikely to recur, which is a conceivable possibility—public opinion would not be slow in calling for something to be done, railway accidents having a peculiar power of attracting public interest.

The precise reason for this is difficult to state, but it is no new fact and was even commented on in their own way by many observers in the early days of the rail. The high degree of safety afforded the traveller has for long been one of the chief assets of the railways, and we are confident it will not be allowed to fall below its present level. That level is already very creditable, but improvement is possible and will no doubt gradually be made. The report is drawn up on the customary lines, with the usual tables enabling a comparison with previous years to be made readily. While some of the figures for any one year cannot by themselves indicate the whole position, being the result of fortuitous circumstances, nevertheless it is possible to judge from the report as a whole whether a tendency to improvement prevails or not. The travelling public is naturally impressed with the casualty figures and feels concerned when it reads of an accident involving many deaths. Regrettable as such accidents are they give little or no guide to the true position. A bad accident can happen to an empty train and pass almost unnoticed, but its cause may be serious and indicate the necessity for important remedial measures; on the other hand an accident from a cause most unlikely to recur may affect a crowded train and painfully impress the public, though it is unimportant from the operating and signalling points of view.

Taking train accidents, properly so called, we find 13 passengers killed and 408 injured in 1935 as against 17 killed and 537 injured in 1934. All the deaths were caused by the Welwyn accident on June 15, 1935. There were 7 servants killed and 81 injured in the same class of accident, against 12 killed and 96 injured in 1934; but for the reasons mentioned only a relative value is to be placed on such statistics, which must be regarded in the light of other circumstances. Welwyn was a serious accident, resulting from a signalman's grave mistake which would have had to be so considered though nobody had been hurt. By good fortune no person was killed in the Ken Viaduct derailment on the last day of the year, though had heavy casualties resulted it would not have been so alarming because, as Colonel Trench reported, it no doubt arose from a peculiar combination of circumstances unlikely to recur. The total casualties in train accidents for 1935, inclusive of "other persons," 30 killed and 529 injured, compare with 25 and 592 for the five year period 1930-1934; and the train mileage of 435 millions exceeds that of 416.2 millions for that period. There

were 733 accidents to trains of every kind, compared with 810 in 1934, the averages for three successive five-year intervals beginning with 1920 being 1,009, 941 and 796, a progressive improvement. As train mileage has been increasing all the time, the public has reason to be satisfied with what the railways are doing in this matter.

Only 16 train accidents—collisions and derailments—were inquired into (namely, 5 more than in 1934 but 2 fewer than in 1933), of which 7 were attended with loss of life, passengers being killed at Welwyn alone; the remaining 9 involved only injury. Inquiries were held into 3 other accidents in which companies' or contractors' servants were hurt. The accidents particularly commented on in the report have all been dealt with in our columns, with the principal features of the respective reports. It is to be noted that 5 derailments called for inquiry, resulting in some important recommendations since put in force. The slip coach collision at Woodford and Hinton was an unusual accident. The recommendations following the Welwyn accident amounted to asking for lock-and-block. During the last few years, on many sections of line, the plain block telegraph has been supplemented by apparatus going far towards a complete lock-and-block and this, with the various further installations of track circuiting and light signals, has materially contributed to improve the factor of safety. Recommendations were made in 15 inquiries, adopted wholly or partly in 11 cases, the remainder being under consideration. Automatic train control would probably not have prevented any accident inquired into, but might have prevented, or mitigated the effects of 24 others, excluding certain level crossing accidents.

A most interesting feature of the report is that Colonel Mount is again able to refer to the vexed question of "stop and proceed," under discussion with the companies for some time, following the accidents at Alne and Three Bridges in 1933 and Kilburn Bridge in 1934. In his report for the latter year he said that "the adoption of additional safeguarding measures is receiving consideration," and he now writes:—

"During the course of the year the railway companies agreed that, except on purely electric passenger lines, the Stop and Proceed Rule should no longer be applied as a result of traffic delay, but should be restricted to cases of defined emergency; to this end the display of an illuminated letter P (normally dark) will be the authority to pass an automatic signal at danger on those sections of railway where the Stop and Proceed arrangement is not authorised under all conditions."

This system of working has been put into operation in the Southern Railway's new light signal installation from Waterloo to Hampton Court Junction, described in our issue for May 29 last, and the results will be of much interest to traffic officers. It is to be noted that the use of the calling-on arm was involved in 18 train accidents in 1935, where presumably insufficient care was exercised when travelling in a section plainly indicated to the driver as probably obstructed. There were 44 buffer stop collisions involving injury.

The figures for accident to, or failure of, rolling stock or permanent way, such as failures of engines—boilers, pipes, machinery, springs—tyres, axles, coupling apparatus, and rails, show the companies to be making steady improvement in these respects, although under some headings the figures are a little higher than for 1934. A striking advance has been made with regard to coupling apparatus in the last ten years. The average annual number of failures for the period 1920-1924 were 10,675, but it was only 4,696 for last year, of which 962 cases were in passenger trains. "The figures continue to prove," says Colonel Mount, that the chief liability to failure is to be found in the weakness of drawgear, which accounts for 90.95 per cent.

of the total in the case of goods trains and 92.41 per cent. in the case of passenger trains, as compared with 91.51 per cent. and 91.54 per cent. respectively for 1934." These failures cause enough anxiety and expense to make their elimination highly desirable, but the risk of accident attributable to them is low. The Shrivenham accident, however, which fell just outside the period covered by this report, has again emphasised the importance of improving coupling equipment to the utmost extent practicable.

Level crossing accidents reported totalled 210, including those to pedestrians, the same number as in 1934. Casualties occurred in 85 cases, with 51 killed (39 pedestrians) and 51 injured, and material damage to gates or road vehicles in 125 cases. The deaths are more numerous but the injuries less so than before. Here again cautious interpretation of the figures is necessary. There are 4,560 public road crossings in the country, of which all but 200 are provided with gates and are attended. Of the 31 cases thereof involving casualty, 12 were attributable to faults of railway servants, 11 to careless road drivers and 8 to careless pedestrians. The exceptional increase in fatalities is mainly due to fatal accidents to 32 pedestrians at occupation crossings, while 6 occupants of road vehicles were killed thereat. Colonel Mount points out that though the improvement made during the 5 previous years has not been maintained, the figures compare favourably with the 1925-1929 average (51 killed, 48 injured) having regard to increased road user, and observes that:

"The risk of accident at public road crossings is negligible compared with other risks of the road, the user having every justification for expecting a safe passage when the gates are open for the road. But in respect of the average occupation crossing a higher standard of intelligence and care is required to negotiate it safely and no specific responsibility is placed upon Railway Companies by legislation for safeguarding the movement of road vehicles or pedestrians over it."

He emphasises the altered character of many occupation crossings from the increased use to which they are put, and the growing risk due to changes in railway working, such as the use of light railcars. We feel that the occupation crossing must call for more attention before long. In these days of heavy lorries it really forms a negation of all the fundamental principles of safe railway working on which we justly pride ourselves, but the problem is admittedly not easy of solution within the accepted financial frame of reference. At public crossings the previous high standard of safety was generally maintained in 1935.

Turning to accidents other than train accidents, concerning which 391 inquiries were held and recommendations made in 170 instances, we find the figures for passengers killed and injured in attempting to enter or alight from trains, or from the opening and closing of carriage doors at stations, are again high, showing that carelessness is still responsible for much unnecessary suffering. It is not considered that there is justification for pressing for the adoption of any automatic or other door control device. In the mishaps to servants of companies and contractors, misadventure and accident account for nearly 70 per cent., but next to that come want

of caution, misconduct and breach of rules, by the injured person or his fellows. There was a welcome decrease in fatalities to servants in movement accidents, but an increase in non-fatal casualties, the total, 2,601, being a little higher than in 1934. Those due to coupling and uncoupling accidents are also a little higher, with 353 cases, 5 terminating fatally. Three of these were, however, due to misadventure. Improvement is reported in accidents to men struck while working on the line, over 1934 and the 1930-1934 average, but instances where men were individually careless or suffered from the carelessness of others, showed a regrettable increase. The importance is stressed of educating gangers and others responsible for the protection of men, especially as greater care is now necessary with larger gangs in placing lookout men to ensure their warnings reaching all concerned in ample time. He says:—

"The large percentage of accidents due to want of individual care emphasises the need for bringing home to men on the line the risks attendant upon their calling. Much has been, and still can be, done in this direction by lectures and letterpress, and it seems desirable to give even greater publicity to the circumstances which have led up to accidents in the past, with a view to keeping this important feature in the minds of those concerned."

The non-movement accidents to servants do not present any unusual features. 99.1 per cent. may be described as industrial accidents of a more or less non-preventable character; and as regards passengers the position is substantially similar. To fall down on an escalator or over a wheelbarrow will always be a possibility, and trespassers and suicides are likely to remain a problem.

The report concludes with the following summary table giving a general view of the whole position, which we reproduce as usual. It covers all movement on rail, excluding trespassers, suicides or attempted suicides. From this it will be seen that the incidence of casualty is not merely falling in relation to train-miles, but has in

Particulars	Annual Average, 1920-24		Annual Average, 1925-29		Annual Average, 1930-34		Year 1934		Year 1935	
Accidents to trains ..	1,009		941		796		810		733	
Accidents to or failure of rolling stock or permanent way ..	11,153		9,141		5,772		4,958		4,987	
Casualties:—	K.	I.	K.	I.	K.	I.	K.	I.	K.	I.
Passengers ..	92	2,577	91	3,733	74	4,394	85	4,886	97	4,925
Servants ..	248	3,518	210	3,267	183	2,592	216	2,398	172	2,517
Other persons ..	67	136	67	158	51	146	35	147	66	121
Totals ..	407	6,231	368	7,158	308	7,132	336	7,431	335	7,563
Passenger journeys, including estimates of those of season ticket holders (millions) ..	1,848		1,661		1,612		1,638.6		1,697	
Freight tonnage (millions)	322		320		288		289		290	
Net ton-miles (millions) ..	17,457		17,562		16,060		16,219		16,411	
Companies' servants employed (March) ..	707,574		680,197		603,621		576,362		582,091	
Passenger and freight train mileage (millions)	368.7		401.3		416.2		427.5		435.0	
All casualties per million train miles:—										
Killed ..	1.1		0.9		0.7		0.8		0.8	
Injured ..	17		18		17		17		17	

itself declined 25 per cent. in 15 years, a gratifying fact when increased speeds and other factors are considered.

(See further reference to the report on page 117)

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Recovering Lost Time

Sudan Railways,
Chief Mechanical Engineer's Office,
Atbara, Sudan. June 23

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—During the past two years or so you have published some interesting, and a few curious, letters under the above heading. It seems to be generally agreed that lost time should be recovered, where practicable, though I feel there are reasonable grounds for the view expressed by some of your correspondents that there exist railway officials who are doing less than they might, and ought, in this direction. Nevertheless, in the haste to provide that present-day need, a formula, is there not a danger of overlooking some of the factors in the equation?

In your issue for August 23, 1935, you rightly draw attention to the cost of speed (pp. 297-298 and 304). I have just received the 1935 Annual Report of the Kenya and Uganda Railways and Harbours, on page 47 of which an increase in coal consumption is accounted for partly by an increase in the average train load and "... in some measure by the instructions issued to enginemen that they must, consistent with speed regulations, endeavour to make up lost time wherever possible ..."

We might well devote some of our research to a study of prevention rather than concentrate on seeking a cure, which observation will serve to introduce another present-day symptom, the consideration of psychological factors. One of my staff quotes the case of an important main line train, at home, on which he has travelled, from time to time, during the past eight years. On every occasion this train has been stopped dead outside a particular station *en route*. In every case the cause of the delay has been that this express could not enter the station because the platform was occupied by another, and less important, train. Up to this point the driver had made every effort to regain any time which might have been lost in the earlier stages. Can a driver be expected to thrash his engine when the experience of most week days for eight years suggests that his precious minutes regained will be squandered in a dead stop within sight of a station?

In this connection national or racial Psychology may be as important as individual temperament. For example, the Sudani is a fine engineman but a light hearted and care-free soul withal. He needs no urge to recover lost time, rather must he be restrained lest he disorganise the Traffic Department and disturb that "restful sleep" so necessary to Chief Civil Engineers. On the Sudan Railways when a train is running out of course and is *not* required to make up time the driver is given written notification to that effect, otherwise he uses his discretion within the limits of any speed restrictions in force. Fortunately the amount of time that has to be recovered is not sufficient to affect seriously the annual coal bill.

One of your correspondents, perhaps with his tongue just a little way into his cheek, suggests encouragement of enginemen by challenge cups. For twelve years now we have had an "Encouragement of Enginemen Scheme" on the Sudan Railways. This scheme awards marks to enginemen under a dozen or so headings, including that of discretion in recovering lost time, and at the end of the year each champion driver in his group is given a high grade watch, while each champion fireman gets a cheaper watch. The champion driver and fireman need not necessarily be on the same engine. The scheme is a great success and is to be recommended where there is no such institution.

We must not lose sight of the fact that constituent railway departments, like the members of the human body, develop at different rates. Some day, when railways are fully grown, the Chief Civil Engineer will build a track that will accommodate maximum locomotive performance, and in that time the Traffic lion will lie down with the Mechanical lamb. But even then will critics cease from troubling and will enginemen be at rest?

Yours faithfully,

J. H. DUNBAR,
Chief Mechanical Engineer

Design on the Railways: The Beauty of King's Cross

26, Pancras Road,
London, N.W.1. July 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—It was a most pleasant surprise for me to see the editorial "Design on the Railways" in your issue of July 3 referring to my contribution on the same subject in a recent number of *Design for Today*. In your editorial you asked what the public thought of our old stations when they were built. So far as King's Cross is concerned, you will recollect that when it was opened, on October 14, 1852, comment was made that "it wore a magnificent appearance" and presented "a vista of extraordinary effect." Even judged by present-day standards, King's Cross is still considered a more functional design architecturally than many other British railway stations, and when the terra cotta tube station and other miscellaneous clutter in front of it are at last removed, it may receive again some of the praise bestowed after the opening.

Let me conclude with some pertinent remarks from "Ghastly Good Taste" by John Betjeman, 1933. "Whoever considers King's Cross station today? Yet it is one of the finest buildings in the world. Two enormous brick arches filled with glass, divided by a plain tower with no superfluous decoration. The offices, blocks and the crescent-shaped hotel form part of the same scheme, simple buildings with an appropriate veneer of classical decoration. And inside the station are those two great receding tunnels of glass, with their rhythmical pattern of iron girders and supports."

Yours faithfully,

GEORGE DOW

[We reproduce a view of King's Cross station as it appeared over 80 years ago in a contemporary painting. The station



King's Cross station over 80 years ago, from a contemporary painting

was planned by Mr. Lewis Cubitt on the lines of a riding school then recently built at Moscow for the Czar. Although the phrase "functional efficiency" had not at the time attained its present popularity, the architect was nevertheless actuated by thoroughly modern principles, for he justly claimed for the building that it was to "depend for its effect on the largeness of some of its features, its fitness for

its purpose, and its characteristic expression of that purpose." The station building was the subject of so much admiration that shareholders in the old Great Northern Railway raised complaints of extravagance in erecting so splendid a station. The chairman replied that it was the cheapest building in London for what it contained and would contain, and quoted the cost as £123,500.—[Ed., R.G.]

PUBLICATIONS RECEIVED

Guide to Current Official Statistics. Vol. 14 (1935). London: H.M. Stationery Office, Adastral House, Kingsway, W.C.2. 9½ in. × 6 in. 365 pp. Paper covers. Price 1s. net.—The aim of this guide, published annually by the Permanent Consultative Committee on Official Statistics, is, as set out in the explanatory introduction, "to direct the inquirer to all current official publications that contain statistics bearing on his subject, and, more especially, to inform him of the nature of the statistics he will find in the volumes to which he is referred, i.e., their mode of analysis and the time and place to which they relate." A typical reference is as follows:—"Railways—Horses—Road Vehicles; each railway group, all railways—G.B.—1932, 1933, 1934 (preliminary statement)." Against this is given an index number referring to the appropriate official publication, which is listed separately. This useful guide deprives the pile of blue books of much of its formidability.

The Outline of Iron and Steel. By Archibald Allison. London: H. F. & G. Witherby Limited, 326, High Holborn, W.C.1. 8 in. × 5½ in. × 1 in. 191 pp. + art plates. Price 6s. net.—In his prefatory note the author states that his object is to present a brief, and therefore outline, statement of the whole field of iron and steel manufacture as it now exists. A perusal of the volume shows clearly that he has succeeded and, therefore, the work is well worthy of recommendation both to those who require an accurate but only superficial knowledge, and also to the student seeking an introduction to more detailed studies. The latter is further helped by a useful bibliography.

So far as railways are concerned, the author reminds us that up to the middle of the nineteenth century wrought iron was used almost exclusively. Locomotive boilers were made of wrought-iron plates joined by wrought-iron rivets; the engine and framework, except the cylinders, were of the same material, as also were axles and wheels and even the rails on which they ran. Considerable progress followed the introduction of Bessemer steel, and the tremendous increase in the world's railway mileage from 1850 onwards justifies Mr. Allison in saying "there is little wonder that, of all inventors, Henry Bessemer probably reaped the richest harvest, because it is stated that he drew over £1,059,000 in royalties from licences granted to all countries."

In the chapter dealing with the open-hearth process of William Siemens, the author says that the usual difficulties were encountered in obtaining a trial, but ultimately, in 1863, a small works, Sample Steel Works, was started to demonstrate the process, and here old wrought-iron rails supplied by the G.W.R. were melted with ferromanganese and converted into satisfactory steel rails. The L.N.W.R. introduced the process at Crewe works five years later. Thomas & Gilchrist (the jubilee of whose discovery of the Basic process was celebrated in 1929) are next dealt with, and so the reader is led up to the second half of the volume, which deals with 20th century practice. An adequate index adds materially to the reference value of Mr. Allison's book.

Land Transport in the Stamp Album. By A. E. Gould, L.L.A. London: Stanley Gibbons Limited, 391, Strand, W.C.2. 7½ in. × 5 in. 58 pp., illus. Price 1s.—The day is long past when it was possible for an ordinary stamp collector to cover intelligently the whole world, and specialisation has become the accepted thing. An obvious course is to concentrate on one country, but this is by no means the only form of specialisation open to the philatelist of limited means. Postage stamp designs (particularly those of modern issues) are so often pictorial and depict such a variety of subjects that nowadays many collectors take solely those stamps which illustrate the special subjects that interest them. To cater for this new type of collecting, Stanley Gibbons Limited decided to issue a series of shilling booklets called the "Stanphil" stamp books, under the editorship of Mr. Stanley Phillips. Some months ago the first two appeared, namely "By Air Through the Stamp Album" and "Native Races of the Stamp Album." These have proved so popular that the firm has now produced three more, including the one under review. In this the authoress deals with the various methods of carrying goods and passengers throughout the ages—from woman (the "first beast of burden," as Miss Gould calls her) to such modern means of transport as diesel-electric trains and high-powered cars—and, throughout the whole story, constant references are made to the stamps which illustrate every stage of progress.

On the whole, the historical and descriptive details which provide the background to a collection of stamps depicting various forms of transport

are well chosen and generally accurate, but the railway specialist must not expect to read the seven chapters of this book without finding occasional technical inaccuracies. For example, one of the illustrations of stamps—there are 108 in all—shows an obvious diesel-electric train which the caption describes as a diesel locomotive. Actually it is inadequacy of the captions throughout the book that constitutes the weakest feature, for many of the illustrations (even including those which do not bear a single word in roman characters) are entirely without descriptions, while others bear such laconic titles as the one word "Lorry." However, the book provides a very good shillingworth, and the authoress will doubtless strike a sympathetic chord for railway philatelists, for whom are available so many foreign specimens, when she says "When shall we see the Royal Scot or the Cheltenham Flyer on the stamps of Great Britain?"

Planers and Moulders.—A leaflet received from Thomas Robinson & Son Ltd., Rochdale, draws attention in particular to the advantages of the application of vee-belt drives to planing and moulding machines. An electric travelling head cross-cutting and trenching machine is also described and illustrated.

"The Best in Asbestos."—The latest catalogue of the Asbestos Manufacturers Co. Ltd. which bears this title, describes the wide range of materials and equipment supplied by that firm, including packings for hydraulic and high- and low-pressure steam use, webbing, listing and millboard, also cloth, paper, millboard tubes, fireproof blankets and clothing. Belting and insulating materials as well as lagging and piping and hose complete the series, and the volume concludes with illustrations of works involving the use of asbestos, including the Southern Railway cleaning sheds at Ore, near Hastings.

Carbon and Alloy Steels.—Thos. Firth & John Brown Limited, Sheffield, has recently issued a brochure setting forth the details of the firm's principal carbon and alloy steels. Full details concerning each are given including typical analyses, heat treatment, mechanical and other salient properties, standard specifications met, instructions for manipulation, and applications and uses. In fact the endeavour has been to tabulate the data normally required in order to select the steel most suitable for any given purpose. To facilitate reference the various steels have been subdivided into different classes.

THE SCRAP HEAP

Running for a Chicago tramcar the other day, a prospective passenger landed unexpectedly in a heap of shattered glass and warm dough-nuts. Confused by blurred vision, he had mistaken the car's reflection in the window of a baker's shop for the real article.

A passenger at the instance of the directors of the London and Brighton Railway, has been sentenced to six weeks' imprisonment in the Steyning House of Correction, for defrauding the company by using a non-transferable ticket issued to another person.—*From the "Illustrated London News" of October 11, 1881.*

A most important "passenger" travels several times daily under the coach of a train between Hythe (Kent) and Sandling Junction, six miles away. It is a blackbird's egg. The hopeful parents wait patiently at Sandling while the train is away. Each time it comes back they hop under the coach to examine their "home" and the precious egg it contains. When the train has made its last journey and is shunted for the night, into the nest they go.—*From the "Daily Express."*

TRAFFIC MUSEUMS IN GERMAN ROADHOUSES

Roadhouses in Germany, built at intervals along the great new stretches of motoring roads throughout the country, will have not only a restaurant but also a traffic museum. The first has just been established at Mannheim on the motor road from Heidelberg to Frankfurt-on-Main. In the museum are to be seen models of the first bicycle invented by Baron Drais, the first car produced by Carl Benz, old Roman wine ships, and the first German railway.

If a bus, coach, or car has a rounded corner somewhere or a rakish line painted on the side it is at once dubbed "streamlined." The indiscriminate use of the word "streamline" may be pardoned, perhaps, in application to vehicles or aeroplanes, for it does suggest capability of speedy motion, but can't we be spared its use in other directions? Radio sets, gramophones, tables, and new houses are described as "streamlined." H.M.V. have just introduced a "streamlined" refrigerator, and, worse still, I found this morning that my toothbrush bore a stamp, "streamlined model." Perhaps these enthusiastic manufacturers would not foist this word on us quite so much if it were generally realised that the common or garden slug is a beautiful example of real streamlining.—*From "Motor Transport."*

"POWER OF STEAM KNOWN TO THE ANCIENTS"

In the July, 1836, issue of our predecessor, *The Railway Magazine*, the following letter to the Editor from a Deptford reader was published:—

Sir,—Among the numerous competitors for the honour of having first suggested steam as a moving power in mechanics, writers on the subject have made principal mention of Hero of Alexandria, Brancas, and our countryman the Marquis of Worcester, as occupying the foremost rank. I was therefore naturally pleased on finding a palpable allusion to steam power as resorted to in the sixth century; and I transcribe the passage from Gibbon's "Decline and Fall."

"A citizen of Tralles in Asia had five sons, who were all distinguished in their respective professions by merit and success. . . . The fame of Anthemius, the mathematician and architect, reached the ears of the emperor Justinian, who invited him to Constantinople. . . . In a trifling dispute relative to the walls or windows of their contiguous houses, he had been vanquished by the eloquence of his neighbour Zeno; but the orator was defeated in his turn by the master of mechanics, whose malicious, though harmless stratagems, are darkly represented by the ignorance of Agathias. In a lower room Anthemius arranged several vessels or cauldrons of water, each of them covered by the wide bottom of a leathern tube, which rose to a narrow top, and was artificially conveyed among the joists and rafters of the adjacent building. A fire was

kindled beneath the cauldron; the steam of the boiling water ascended through the tubes; and the house was shaken by the efforts of imprisoned air, and its trembling inhabitants might wonder that the city was unconscious of the earthquake which they had felt. . . . The orator declared in tragic style to the senate, that a mere mortal must yield to the power of an antagonist who shook the earth with the trident of Neptune, and imitated the thunder and lightning of Jove himself."

The Milwaukee Railroad demonstrated the superiority of railroad facilities over trucking during the recent snowbound spell. Stickney had enough coal—for one reason only—and that is because the railroad hauled it in. If this town had been forced to rely on trucks for a coal supply, the residents would have been in cold straits, and what coal could have been obtained would have cost a fortune. This paper was late last week for one reason only, and that is because we relied on truck transportation for newsprint. . . . When snow catches a truck, there it stays. The driver hies himself to the nearest town, and his truck rests comfortably in a snowdrift, while the main office listens to radio reports on road conditions, and waits for a state plough to come along. The railroad doesn't wait for any help. It pulls, hauls and digs all its trains out with its own employees and own equipment. . . . This editorial is our own opinion and was not suggested or inspired by any conversation with or information from any railroad employee.—*From a leader in a South Dakota newspaper.*



Having been privileged to sample the great birthday cake which stood in Windsor station, Montreal, when the C.P.R. Golden Jubilee train left for Vancouver, we are able to pay tribute to its excellence. The photograph reproduced was taken in our studio before we had tested its edible qualities

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

INDIA

Transport Advisory Council

The Viceroy will open the meeting of the Transport Advisory Council which will be held in Simla on July 13 *et seq.* It is understood that the representatives of the Government of India will include Sir Frank Noyce, Sir James Grigg, Sir M. Zafrullah Khan and Sir Guthrie Russell. Provincial representatives will possibly include Ministers and technical experts.

Railway Freights

It is gathered that the Indian Railway Conference Association has formulated proposals for a re-classification of some 300 commodities, involving increase in freights. These proposals will be carefully examined at a meeting of the commercial sub-committee of the association to be held at Bangalore in July. The sub-committee will also consider the criticisms that are made on the proposals by the interests concerned.

Railway Views of Road Competition

An informal meeting was recently held between the representatives of the Calcutta Chambers of Commerce and the Agents of the Bengal-Nagpur, East Indian and Eastern Bengal Railways, with Mr. V. E. D. Jarrad, Agent of the former, in the chair, to explain the measures taken to meet road competition by their respective administrations. These mainly consisted of improvements in services and increased facilities for passenger and goods traffic, and also reductions in charges wherever such action was called for. The East Indian Railway is the system most affected by road competition, and Mr. J. A. Bell, Agent of that system, stated that his railway was running about 800,000 additional passenger train-miles to cope with motor bus competition on parallel routes. In most cases, however, the returns had not been commensurate with the extra expenses involved, and in one instance, the railway had spent Rs. 21,000 on additional services which yielded additional revenue to the extent of Rs. 2,000 only.

The Burden of Low-Rated Traffic

Mr. Bell added that the attitude of the railways towards road transport was misunderstood, and pointed out how the commercial and industrial community and the railway users in general were directly interested in the prevention or curtailment of uneconomical and irresponsible road competition. He placed before the meeting figures showing that the bulk of the E.I.R. traffic consisted of coal and other low grade traffic in which the road haulier was not interested. It was obvious that if the earnings from

the small proportion of high grade traffic, which could afford to pay relatively high rates, continued to fall as a result of road competition, the railway could not, without becoming a burden on the State, maintain the present low rates on the preponderating volume of low grade traffic. On the other hand, there was a wide sphere in which road transport could develop without competing with the railway. The best interests of the country required the extension of transport facilities rather than the wasteful competition and duplication of facilities that occurred under existing conditions.

Coal—Two-thirds of Total Traffic—Carried at a Loss

On the general subject of coal freights, Mr. Bell stated that the E.I.R., coal and coke accounted for approximately two-thirds of the total goods ton-mileage and realised an average revenue of 2.95 pies (¼d.) per ton-mile, inclusive of surcharge. The statistical average cost of working goods traffic on the railway, inclusive of interest charges, was 3.77 pies (0.31d.) per ton-mile. A considerable proportion of the remaining one-third of the traffic consisted of other mineral and low grade traffic carried at low rates of freight. Thus, a preponderating volume of the total traffic was carried at rates yielding substantially less than the statistical cost of operation, and left little or no margin for reductions in the charges for transport. The average receipts per ton-mile from all goods traffic amounted to 4.06 pies (0.34d.); even the small margin of profit thus left was threatened by the inroads of motor transport.

The Bengal-Nagpur Agent pointed out that approximately 72 per cent. of their total goods traffic consisted of low-rated mineral traffic. Coal and coke, representing 49 per cent. of this total, were carried at the same rates and under the same conditions as those obtaining on the E.I.R. With such a high preponderance of low-rated traffic, the actual earnings per ton-mile were even less than on the E.I.R. The railway, therefore, could not afford to reduce further the freight for low-rated traffic. The railways also explained their reasons for the introduction of the receiving end terminal on coal traffic.

Wider Goods Facilities Welcomed

The Chambers' representatives welcomed the idea of collection and delivery services and the opening of depots for goods traffic in Calcutta, which the E.I. and E.B. Railways had under consideration. They felt that such services would be of great convenience to merchants and traders and

should also prove of material assistance to the railways in dealing with road competition.

Heavy Rains Interrupt Communications

The scene of activities of the monsoon flood demon has shifted from Eastern Bengal and Assam to Orissa, and the Bengal-Nagpur Railway train services on the East Coast section were greatly disorganised between June 12 and June 14. Heavy incessant rain for about 36 hours caused a portion of the railway line to sink by about 4½ feet and a bridge at mile 193 was rendered unsafe for the passage of trains. The running of the Madras Mail and the Puri Express from Howrah had to be suspended, as also the Puri Express from Puri. The Down Madras Mail was terminated at Khurda Road and mails to and from Calcutta were diverted to the Vizianagram-Raipur route. Repairs were promptly taken in hand and through communications were restored on June 15, but the interruption has somewhat interfered with the pilgrim traffic to Puri, in connection with the famous Car Festival which began on June 21. Nevertheless, over 50,000 persons witnessed the Lord Juggernaut's state drive on the opening day.

Accident Near Kurukshetra

A head-on collision at Kelat station near Kurukshetra—site of the recent solar eclipse fair—between an empty rake returning from Kurukshetra and a pilgrim train to that station on the morning of June 18, resulting in the death of two passengers and in injuries to 65, marred the otherwise successful solar eclipse festival on June 10. It is estimated that over 300,000 pilgrims visited Kurukshetra on this occasion. Some 34 special trains were run, carrying pilgrims to Kurukshetra, and ten special trains were kept ready for the departure of the visitors on the conclusion of the eclipse. The evacuation was completed in two days.

SOUTH AFRICA

Express Electric Railcars

The administration has approved of the purchase of two electric railcars for express service, with trailers, between Durban and Pietermaritzburg; the trailers will be converted from existing vehicles. These cars will be air-conditioned and fitted with a buffet. Accommodation is to be provided for all classes of passenger. It will be remembered that this section of line which is about 75 miles in length contains a 50-mile climb out of Durban, from sea level to about 2,600 ft. altitude, and then a fall of about 500 ft. in the final 25 miles to Pietermaritzburg. The average gradient is therefore about 1 in 100 throughout, but actually there are long 1 in 66 gradients to be faced, and consequently, although the proposed schedule for these railcars includes only one inter-

mediate stop, the suggested overall time is about two hours, which will entail remarkable climbing speeds if it materialises as expected.

Empire Exhibition at Johannesburg

The administration has made a cash grant of £25,000 to the British Empire Exhibition which is to be held in Johannesburg from September, 1936 to January, 1937. In addition, a reduction of 25 per cent. in railway fares to overseas visitors will operate throughout the entire period of the exhibition. Shipping companies have, as a result of representations by the railroad administration, agreed to grant special fares.

Other facilities decided upon are:—excursion fares from all stations in the Transvaal and Orange Free State for the period September 25 to October 2, and special excursion trains on specified dates in September, October, and November from Capetown, Durban, Port Elizabeth, and East London. For the period November 28 to January 2, excursion fares will operate from any part of the Union, and during the whole period of the exhibition there will be special concession facilities for duly organised parties of scholars.

De Luxe Beds for Union Limited and Other Trains

A service of *de luxe* beds, comprising a special mattress with standardised S.A.R. bedding, has been introduced on the Union Limited and Union Express trains at an inclusive charge of 7s. 6d. These *de luxe* beds will also be supplied on all the other trains at the same charge, subject to prior reservation of such beds either at the time of booking or at least 24 hours in advance of the commencement of journeys. All bedding equipment is steam laundered and both bedding and mattresses are thoroughly sterilised by a special process before issue. The present charge for bedding is 3s. a set.

UNITED STATES

All B. & O. Main Line Stock Air-Conditioned

The Baltimore & Ohio Railroad has placed orders for over 100 air-conditioning plants for passenger coaches this year, bringing the total number so equipped to over 500, sufficient for practically all its main line trains. As has been the practice throughout, the work has been done in the B. & O. workshops, though the York Ice Machinery Corporation has supplied the refrigerating units. The completion of this year's orders will place the B. & O. farther in the fore-front of all railways in the matter of air-conditioning, which is proving so successful in America and elsewhere, not only from the point of view of the passenger's comfort, but also as a definite inducement to rail travel.

VICTORIA

Air-Conditioned Vehicles in Service

The first air-conditioned passenger carriage on the Government Railways has now completed nearly five months' regular running, during which time it has covered over 40,000 miles and carried more than 7,000 passengers. From the outset it has been an outstanding success, many letters of appreciation having been received from passengers testifying to the hitherto unapproached standard of travelling comfort provided by the equipment.

The second air-conditioned unit—an all-steel dining car—was placed in regular daily running, on February 13, on the Melbourne-Sydney Limited. New and original light fittings, representing a complete departure from train lighting standards in Victoria, have been incorporated in the car [as illustrated in our issue of April 3 last. Ed.—R.G.] More than 20,000 people have patronised the dining car for meals and refreshments, the total mileage covered by the car being in excess of 30,000. The installation of the air-conditioning equipment has been carried out at the department's own workshops under the supervision of Mr. A. H. Chilton, Chief Electrical Engineer of J. Stone & Co., England.

Sleeper Durability Investigations

Comprehensive tests of the durability of sleepers cut from eucalypts, which are generally classed as "non-durable," are to be undertaken by a committee representing the Commonwealth Council for Scientific and Industrial Research, the Forests Commission of Victoria and the Victorian Railways Department. This action has been decided upon following the probable scarcity of first-class durable timbers. The committee will investigate the desirability of preservative treatment, the degree to which the less durable timbers can be used in subsidiary tracks, the efficacy of sleeper plates, and the co-relationship of the conditions of growth and location to the life of sleepers.

Treatment Tests

It is proposed to test sleepers from seven of the less durable species of Victorian trees and lay them in five different localities. Four methods of preservative treatment and two types of sleeper plates will be used, and a comparison will be made with untreated and unplated sleepers of the same species. To determine the proper methods of treatment, the chemicals to be used and the strength of solutions required for treating, tests are being carried out with a large number of small sections in the various timbers. Sleepers will be marked with distinguishing letters and numbers, and laid in order of species, treatment, and plating. For comparison, the grey box and yellow stringy-bark sleepers now commonly used will be laid in the test sections.

The locations for tests have been fixed to enable comparisons to be made of sleepers on straight tracks and on curves, under light and heavy traffic, and under differing climatic conditions. Over 3,700 sleepers will be required for this test. Based on renewals on all lines, the average life of a sleeper in Victoria is 30 years. On a number of branch lines built about 45 years ago, more than half of the original sleepers are still in the track, but on the suburban and main lines built about the same time, two renewals have been necessary.

SPAIN

Shareholders and Press Luncheon

The financial representatives of the Madrid daily press were invited to a special luncheon held in Madrid on June 27 by the Association of Share and Debenture Holders of the Spanish railways. Leading members of both interests made sympathetic references to the recognition by the press of the present difficult situation of the railway undertakings.

The Ponferrada Accident

The head-on collision which occurred on the Corunna line of the Northern of Spain Railway on June 23, between the stations of San Miguel de Dueñas and Ponferrada, proved to have been the worst accident recorded on the Spanish railways for some years past. The line where the accident occurred, is single, and is worked on a telegraphic verbal line clear system. The Corunna express from Madrid was, apparently, allowed to leave the station of San Miguel de Dueñas although a goods train had already left the next station of Ponferrada in the direction of Leon. The two trains met in tunnel No. 27 (km. 243) at 5.25 a.m., and, although the speed of all trains is reduced at this point, the collision was a disastrous one. Eighteen persons were killed, including the driver and fireman of the express and ten permanent way labourers who were travelling in the forward van, and some 40 were injured. The work of rescue and clearing the line was rendered doubly difficult by the telescoping of the wreckage within the tunnel forming an indescribable mass of tangled iron and splintered woodwork.

TURKEY

German Locomotives for Taurus Express

Three of the four express locomotives and ten coaches ordered from Germany by the Turkish State Railway administration have now been delivered. The engines are to be placed in service on the Taurus Express, and are expected to reduce the time of the journey between Istanbul and Ankara, from 14 to 11 hours.

QUEENSLAND

Railway Pageant

At Brisbane on May 10, there was staged a pageant with the idea of attracting public attention to the progressive policy pursued by the Railways Department in providing trains of the most modern design and of a standard of comfort comparable with the best obtainable elsewhere. A feature of the pageant was the inclusion of the first train which ran on the Queensland Railways more than seventy years ago in striking contrast with one of the latest trains also exhibited. (See illustration on page 114.)

The trains and vehicles taking part in the pageant were assembled alongside the lawns at the Mayne Junction locomotive and carriage depot and from there ran in procession to the principal goods depot at Roma Street, a little more than two miles distant, over a route which passes through a large area of park land, and was chosen because of the many advantage points available to the public from which to view the procession. The pageant opened with the departure of a goods train of maximum length, followed by a number of operating units, including a fletcher's manually-operated tricycle, a maintenance gang's manually-operated pump car, a gang's section railcar and an inspector's motor tricycle.

Back to 1865

The passenger rolling stock section of the procession was headed by the first train in Queensland, consisting of a locomotive, carriage, and a guard's van. It travelled under its own locomotive power, and was the source of much amusement, especially as it was operated by a crew wearing the uniforms and facial fashions of 1865, the year when railways in Queensland were first established, and carried a number of passengers attired in the fashions of that day. Behind this train ran an old type of passenger railcar. A special-party railcar led the section comprising modern rolling stock, which included the latest diesel train, and the rear of the procession was brought up by the most modern train in Queensland, the Sunshine Express, specially designed and constructed for the 1,043 miles journey between Brisbane and Cairns, over which route a large tourist business is handled.

Enthusiasm of Public

So great was the public interest that the route of the procession was lined by more than 40,000 people, who in their enthusiasm to obtain the closest possible view, disregarded fences and barriers, with the result that each train or vehicle in the procession could proceed only at a very slow speed through the mass of people who swarmed over the track. At Roma Street, where thousands of people awaited their

arrival, the trains and vehicles were arranged alongside the lawns, on which also were displayed for public inspection the first boiler and pump used for locomotive water supplies in Queensland. For the benefit of country residents a description of the proceedings was broadcast through National and commercial broadcasting stations.

After the pageant the first train to run in the State—which previously had been housed in the Department's principal workshops at Ipswich—was moved to a site on the Roma Street lawns, where it will be on permanent exhibition to the public together with the first boiler and pump.

New Administrative Offices

On the day following the pageant, the official opening of the new administrative offices marked the transfer of the Commissioner's office from the oldest to the newest Government building in the State.

NEW ZEALAND

More Details of the New Railcars

The first of the new railcars [which as recorded in our overseas columns on July 10 made its trial trip on June 1—Ed. R.G.] has been named *Maahumui*, after the canoe of the Polynesian explorer Maui, who discovered New Zealand about 700 A.D. Six other 49-seater cars are being constructed to work over the Wellington—Palmerston North section, which includes the Rimutaka incline. Not only will they reduce by 1½ hours the duration of the journey over a 66-mile length of this run, but they will also replace the Fell centre-rail operation on the incline.

These cars, which are being built in the railway workshops, are particularly interesting in that the 50-ft. underframes—each of which as previously mentioned is carried on six wheels with 10 ft. overhang at each end—are of all-welded fabrication and have a downward set near the front end and are forked in the vertical plane at the rear, to accommodate the luggage container under the floor. Each railcar will cost about £4,000 only, or little more than a first class coach for the Limited express which carries only 30 instead of 49 passengers, and, of course, has no engine or transmission.

CZECHOSLOVAKIA

New Railcars

Two all-steel 80-seater streamlined railcars are being built at the Tatra workshops for the State Railways, for service between Prague and Bratislava (Pressburg). The time between these two centres, which are 397 km. (246½ miles) apart, will, it is stated, be reduced from 5 hr. 41 min. to 4 hr. 52 min., when these new cars start

running. They are single-unit vehicles each with two 165 b.h.p. engines designed for alcohol, benzole mixture or dynalcol, and their bodies are divided into two compartments separated by a small buffet, accommodation being for second class passengers only and their baggage. The maximum speed allowed with these cars will be 120 km.p.h. initially, but when the track has been improved it will be raised to 130 km.p.h. Since 1925 the number of railcars in Czechoslovakia has risen from 1 to over 460.

FRANCE

Train Service from Paris to Moscow

A conference of French, German, Belgian, Polish and Russian railway representatives recently held in Berlin decided to improve the train service between Paris and Moscow via Berlin and Warsaw by a direct run to the Russian frontier. It was arranged that the Nord Express, which has hitherto had its terminus in Warsaw, should run on and after July 1 to the frontier station of Niegoreloje, where passengers would find a train giving immediate and direct communication with Moscow. The entire run is to take 43 hr. with a service three times a week in each direction.

Suburban Metro Extensions

In connection with the schemes for public works to diminish unemployment, the Metropolitan Committee of the Paris Municipal Council has adopted a proposal for the immediate carrying out of seven suburban extensions of the Metro lines. These are in addition to the Metro extensions mentioned in THE RAILWAY GAZETTE of May 8 as already in course of construction, and they form part of the original plan for fourteen suburban extensions in all.

The proposed seven new lines would have a total length of nearly ten miles and would comprise nineteen new stations. The total cost is estimated at fr. 612,000,000, or rather more than £8,000,000 at current rates of exchange, and this amount would be included in the programme for financing public works.

The projected extensions are as follow in the order of the original scheme:—

Line No. 7, Porte d'Ivry to the Mairie d'Ivry, length 1,600 m. (1,750 yd.), with two stations; estimated cost, fr. 58 million.

Line No. 13bis, Porte de Clichy to the Pont de Clichy, length 1,700 m. (1,860 yd.), three stations; cost, fr. 93 million.

Line No. 13, Porte de Saint-Ouen to the Mairie de Saint-Ouen, length 1,600 m. (1,750 yd.), two stations; cost, fr. 72 million.

Line No. 4, Porte d'Orleans to the Carrefour de la Vache Noire, length 2,400 m. (2,625 yd.), three stations; cost, fr. 87 million.

Line No. 7 bis, Porte de la Villette to the Cimetière de Pantin, length 1,700 m. (1,860 yd.), two stations; cost, fr. 71 million.

Line No. 12, Porte de la Chapelle to the Eglise Saint-Denis, length 5,000 m. (5,468 yd.), five stations; cost, fr. 167 million.

Line No. 11, Mairie des Lilas to the Fort de Noisy, length 1,680 m. (1,837 yd.), two stations; cost, fr. 64 million.

M. & G.N.R. MANAGEMENT CHANGES

Responsibility for working the Midland & Great Northern and the Norfolk & Suffolk Joint Railways is being assumed by the L.N.E.R. at the beginning of October

FROM October 1 next, the L.M.S.R. and L.N.E.R. have decided to modify the arrangements for working the Midland & Great Northern Railway, which line they own jointly. This important line is 183 miles in length and serves agricultural districts in Norfolk and South Lincolnshire, extending from Yarmouth, Cromer, and Norwich on the east to Bourne and Peterborough on the west. Hitherto the working of passenger and goods traffic has been controlled by a Traffic Manager with headquarters at King's Lynn; this post has been held for many years by Mr. R. B. Walker, who is retiring under the age limit at the end of September. Responsibility for working the line will then be taken over by the officers of the L.N.E.R. The revised arrangements also include the Norfolk & Suffolk Joint Railways.

Railway communication in this district was provided originally by a number of small independent companies.

During the same decade, the Lynn & Fakenham Railway was building eastward from King's Lynn. Its line was opened to Fakenham in 1880, and completed to Norwich in stages during 1882.

This was the position when, by Act of August 18, 1882, the Eastern & Midlands Railway was formed as an amalgamation as from the end of that year of the small companies that had remained outside the Great Northern and Great Eastern Railways, comprising the Lynn & Fakenham, the Yarmouth & North Norfolk, and the Yarmouth Union. By the same Act the Midland & Eastern and the Peterborough, Wisbech & Sutton were merged into the Eastern & Midlands system as from July 1, 1883. In the meantime an extension from Melton Constable to North Walsham had been completed, and opened on April 5, 1883, so that the newly-formed group had an unbroken system from Bourne and Peterborough to Norwich and Yarmouth.

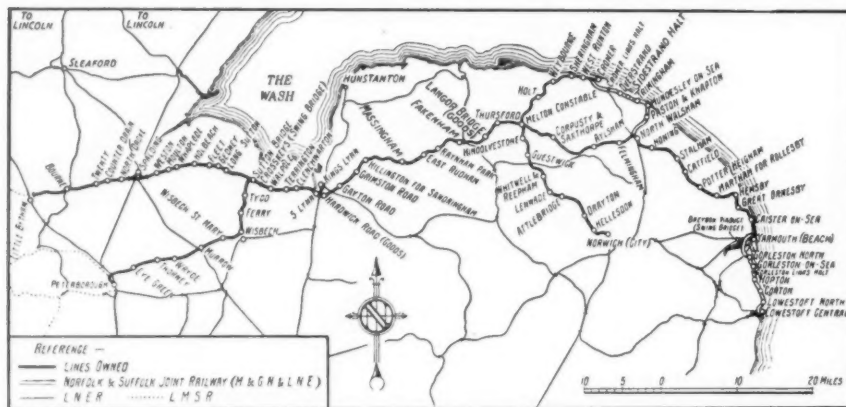
It then undertook a branch to Cromer, which was reached in 1887.

Construction then remained in abeyance until the Midland & Great Northern Railways Joint Committee was incorporated by special Act on June 9, 1893, and took over from July 1, 1893, ownership of the Eastern & Midlands undertaking. The finishing touches to the railway west of King's Lynn were made in 1893, when a short line avoiding Spalding station was brought into service. At the same time a continuation was opened (for goods in 1893 and passengers in 1894) from Bourne to join the Midland Railway line at Little Bytham junction, whereby a shorter route

was made between the Midland system and the Norfolk coast.

In order to round off the Norfolk coast lines, a new joint undertaking—the Norfolk & Suffolk Joint Railways Committee—was established by the Midland & Great Northern Joint Committee jointly with the Great Eastern Railway; this was incorporated by Act of 1898. A branch from North Walsham to Mundesley was opened on July 1, 1898; a line between Yarmouth and Lowestoft on July 13, 1903; and an extension from Mundesley to Cromer on August 3, 1906.

Of the 183 miles 32 chains owned by the M. & G.N., 109 m. 18 ch. are single track and 74 m. 14 ch. double. The steepest gradient is 1 in 56 for a distance of 14 ch. at North Walsham, falling towards Melton Constable. There is only one tunnel on the system, namely, that situated $1\frac{1}{2}$ miles west of Bourne, which is 330 yd. long. Two important swing bridges are: (a) Breydon viaduct, over Breydon Water, Great Yarmouth, which has five spans, one of which swings; and (b) Cross Keys bridge, over the river Nene at Sutton Bridge, carrying both the main road and the railway line—it has three spans, one of which swings. The Norfolk & Suffolk Joint Railways have a total length of 22 m. 22 ch., of which 11 m. 66 ch. are single and 10 m. 36 ch. double.



Sketch map of the M. & G.N. joint railway system

The oldest of the lines comprised in what is now an important group of joint railways is that from Spalding to Holbeach, which was built by the Norwich & Spalding Railway (incorporated on August 4, 1853), and opened on November 15, 1858; it was extended to Sutton Bridge on July 1, 1862. Two other companies—the Lynn & Sutton Bridge (incorporated on August 6, 1861), and the Spalding & Bourn (incorporated on July 29, 1862)—continued the original railway westward and eastward respectively. The Peterborough, Wisbech & Sutton Railway (incorporated on July 28, 1863) completed the system west of King's Lynn in 1866. By Act of July 23, 1866, the Midland & Eastern Railway was formed to take over the Bourne to King's Lynn line and to exercise running powers to Peterborough. The Midland Railway had already secured the working of the Peterborough, Wisbech & Sutton at 50 per cent. of the gross receipts, and the Midland & Great Northern jointly worked the lines between Bourne and King's Lynn; the amalgamation left these arrangements unaffected.

A similar process of construction took place in the northern parts of Norfolk east of King's Lynn. At Yarmouth, the Yarmouth & North Norfolk Railway began building towards the north-west. Ormesby was reached in 1877, Stalham in 1880, and North Walsham in 1881.

ARC-WELDED RAIL JOINTS

A description of experiments carried out in Hungary to demonstrate the merits of rail joints arc-welded in situ

AN exhaustive examination of the economies resulting from the welding *in situ* of rails into long lengths by electric arc-welding, and a comparison of this method and the Thermit system, are contained in an article recently contributed by Herr Desiderius Csilléry to the Hungarian journal *Die Elektroschweißung*. Experiments were begun as long ago as 1920 on the lines of the Budapest Municipal Tramways Company, and have since been followed up by the Royal Hungarian State Railways and the Technical University, Budapest, with the assistance of certain steel firms. These experiments have proved to the satisfaction of the author, that the Katona type of joint, in which arc welding of the rail-heads is

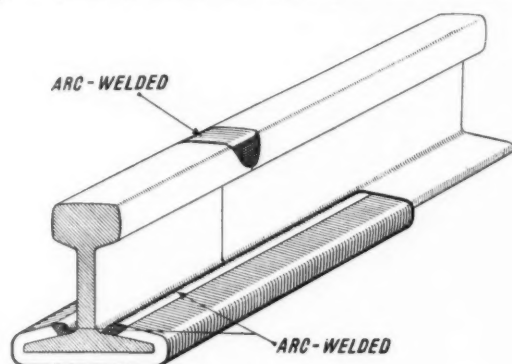


Diagram of Katona joint

combined with the use of a steel fishplate shrunk on to the feet of the two rails, meets the requirements of railway practice at a relatively low cost.

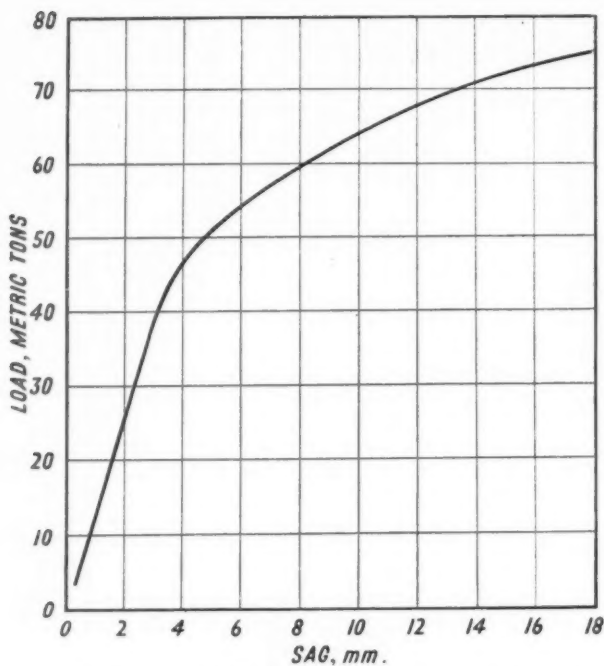
In the first arc-welded rails, the fishplates were welded into the fishing angles of the rails, but this method proved to have various disadvantages owing to shrinkage of the welding seams, which tended to pull the rail-head downwards, or the foot upwards, and so to warp the section. Permanent and undesirable stresses were thus set up in the steel, which could not be relieved apart from the application of a complicated heat treatment. Attempts were made to counteract this tendency by notching the fishplates along the centre-line, so that they might open along the notch rather than pulling on the head and foot, but this was also objectionable in that it transferred the stresses from the rail to the plates, on which reliance was still being placed as the only connection between the two rail-ends. This form of welding also is expensive, and cannot be applied to rails *in situ*. After lengthy experiments, it was found that the best plan was to transfer the fishplates from their normal position to a position below the rail-foot; for this purpose a flat steel plate, of greater width than the rail-foot, and with the two edges bent upwards to form a channel section, is applied in a red-hot condition under the two rail-ends, the two bent edges then being hammered over to clip both sides of the rail-foot of each rail. The inner edges of the two clips are then welded to the rail, and the combined effects of shrinkage in cooling and of welding are to produce a joint of considerable strength. Before this fishplate welding is carried out, the two adjacent rails

have been machined from the running surface downwards through the depth of the head in such a way as to form, transversely to the length of the rails, a narrow U-shaped slot; the lower part of this slot is filled, from the web upwards, in layers, by means of a soft steel welding rod, while the final 6 to 10 mm. of height is filled with a bare alloy rod, and worked in a hot condition. Arc-welding is thus applied to both the head and foot of the rails in this method, which is known as Katona's system. The amount of deposited metal required in the Katona type of weld is a little less than 0.5 kg.

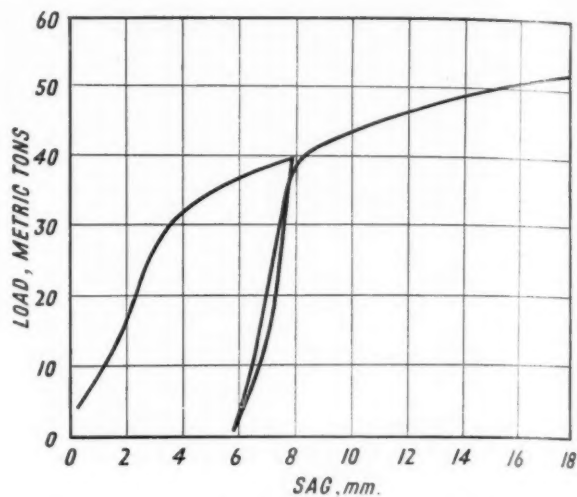
Apart from cost an important consideration in welding rails together is the condition of the steel at the weld. This steel has three constituent parts—the weld metal itself, the transition zones between the weld metal and the rail steel proper, and the portions of the latter which have been exposed to the influence of heat, and therefore to possible changes of structure, if the critical temperature has been passed, and recrystallisation has taken place. Microscopic examination of joints arc-welded by the Katona system shows that the uppermost layer of the weld between the two rail-heads, produced by melting off a bare alloy rod, has an ideal structure, in which the edges of the group of ferrite and pearlite crystals can be clearly distinguished, and the ferrite network is still visible, though the structure has been improved by working with a hammer. Lower down in the weld, where a soft steel welding rod was used, the structure again shows good cooling conditions, with uniform crystals; here there is less pearlite and more ferrite. In the transition zones there is evidence of a satisfactory bond and a good transition from the weld metal to the rail steel, without any coarsely crystalline structure. Thus in this type of joint, the control in regard to the nature of the metal deposited at the weld is good, and the zone of the material exposed to the effect of heat, and therefore to undesirable changes of structure, is reduced to a minimum.

Deflection and Impact Tests

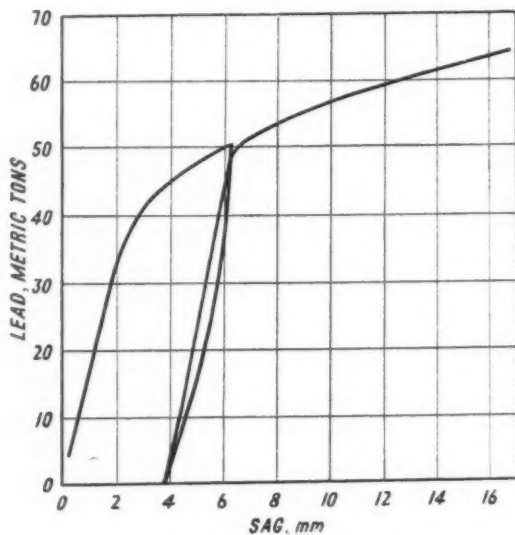
A series of tests was made to determine the resistance of the Katona joint to applied load. First, an ordinary rail-joint, with flat-bottomed rails weighing 31.5 kg. per m. (62½ lb. per yd.) and six-bolt fishplates 80 cm. (2 ft. 7½ in.) long, was taken and laid on supports 60 cm. (1 ft. 11½ in.) apart; the test-length, including rails, measured 110 cm. (3 ft. 7 in.). A load gradually increasing to 40 tonnes was then imposed on the centre of the joint, producing a maximum deflection of 8 mm. (⅝ in.) and on taking off the load the deflection was reduced to 5.8 mm. The load was then re-applied, and at 50 tonnes the set, which had increased to 16 mm. (⅝ in.) had become permanent. An unjointed piece of rail of the same section, 105 cm. (3 ft. 5½ in.) long, similarly tested, showed 16.6 mm. (⅝ in. full) of deflection under a load of 75 tonnes, which had been gradually applied from zero. Of this 16.6 mm., 5 mm. represented permanent set. In applying this test to arc-welded joints of the Katona type, some interesting experiments were made in order to determine the parts which are played by the head weld and the shrunk-on welded fishplate respectively. A test was first made on a joint with the fishplate shrunk on but no welding applied either to this or the rail-heads; with a load of 10 tonnes, the rail-heads had closed, and the gap



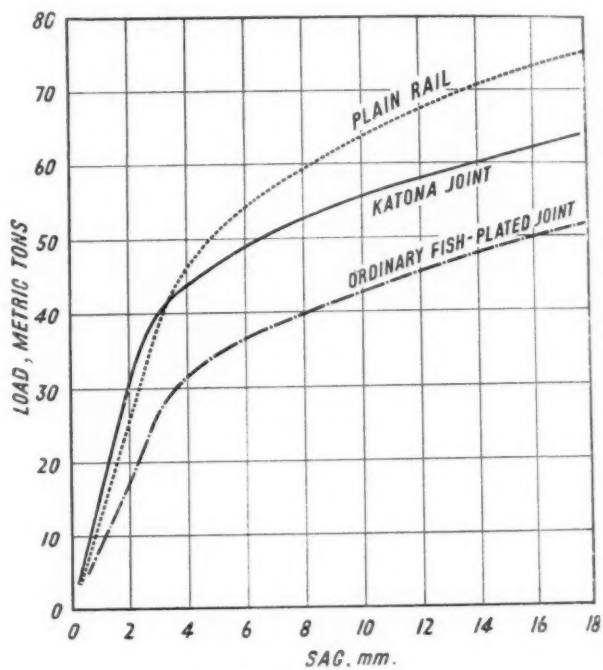
Load diagram on flat bottom rail 31.5 kg. per metre
(or 63 lb.)



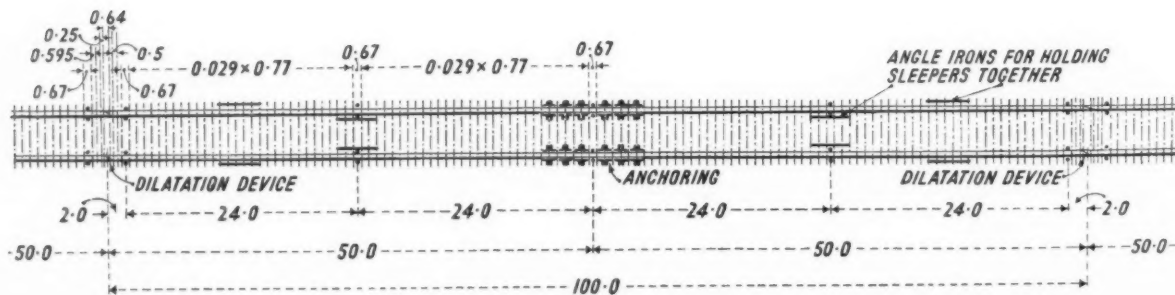
Load diagram of rail joint with normal fishplate



Load diagram of Katona joint



Comparison of load diagrams



Sleeping diagram showing method of anchoring and allowing for expansion with Katona joints

between the feet had opened out to 7.2 mm. ($\frac{1}{4}$ in. full). The deflection was now 10.2 mm. ($\frac{3}{8}$ in. full), but this diminished slightly when the load was taken off, so that even in the event of the head weld being broken through, the fishplate, though unwelded, can be relied on to hold the rails together up to an applied load of at least 10 tonnes. With the fishplate welded in position, but no weld metal applied to the head, the seam showed a crack after the load had risen to 50 tonnes; at 44 tonnes the deflection was 3.65 mm. (practically identical with that of the unjointed piece of rail), and no opening was yet visible between the faces of the two rails; at 58 tonnes the deflection had increased to 11 mm. ($\frac{7}{8}$ in.), and the gap between the rail-feet to 1.5 mm. The behaviour of the fishplate was particularly satisfactory, as it was only ordinary commercial mild steel plate of 10 mm. ($\frac{3}{8}$ in.) thickness.

The next test was to take a completed joint, with both the heads welded, and the fishplate welded on, and to invert the test, in order to put the head weld into tension. At 40 tonnes applied load, the deflection was 3.1 mm.; and on release of the load the permanent set was 0.8 mm.; on reimposing and increasing the load the head weld developed a crack at 46 tonnes, but neither the fishplate nor its welded seams suffered any damage. A completed joint was then tested in the normal way head upwards; at 50 tonnes load the deflection was 6.5 mm. ($\frac{1}{4}$ in.), but on removal of the load the permanent set was 3.7 mm.; on reimposing and increasing the load to 62 tonnes, the deflection rose to 16.2 mm. ($\frac{5}{8}$ in.), and a gap of 3 mm.—with a corresponding elongation of the fishplate—had appeared between the rail feet. After release of the load, the permanent set was 15.8 mm. ($\frac{5}{8}$ in.), but the head weld and the fishplate seams were intact and undamaged. If the curves of applied load and deflection be plotted on one diagram, it will be seen that that of a Katona fish-joint, with welded rail-head and shrunk-on and welded foot fishplate, lies between the curve of a length of solid rail without a joint, and an ordinary bolted joint, the welded joint being superior in resistance to the latter.

An impact test was next applied to an arc-welded joint of rails weighing 42.8 kg. per m. (85 lb. per yd.). The weight of tup was 500 kg. (1,102 lb.), the height of fall 1.10 m. (3 ft. 7 $\frac{1}{2}$ in.), and the distance between the supports on which the joint rested 70 cm. (2 ft. 3 $\frac{1}{2}$ in.). A total of 19 blows was needed before failure took place, and this was of the foot fishplate, as the welded heads still held together. A similar test was applied laterally, the joint being laid on its side on supports 80 cm. (2 ft. 7 $\frac{1}{2}$ in.) apart for the purpose, and exposed to blows from a tup of 250 kg. (551 lb.) falling 1.25 m. (5 ft. 11 in.); six blows were sustained before failure took place. Tests of joints over long periods involving constant reversals of stress were also made, but gave little more information than is afforded by the corresponding tests to which the joints are subjected when actually in service.

Experience in Service

On the lines of the Budapest Municipal Tramways Company, and of the Budapest Local Railways Company, there have been nearly 6,800 arc welds of rail-joints made since this method was introduced, of which 76, or 1.13 per cent., had failed. Some of the failures of the arc-welded joints were due to the fact that, owing to international conditions, it was not possible to obtain high-grade welding rods from abroad, so that experiments had to be made with various welding rods of Hungarian manufacture; 30 of the failures occurred in one single line, partly because the welding of chromium rails had been attempted, and proved unsatisfactory, and partly because the wrong type of welding rod had been used. On this

and another line on which similar trouble was experienced, despite the fracture of the rail-heads at the welds, no repairs have been carried out, in order that the efficiency of the shrunk-on welded fishplates may be tested out to the full, and up to the present time no trouble has been experienced. These special and non-recurring reasons account for 63 of the failures of arc-welded joints, leaving only 13, or 0.2 per cent. of unexplained failures. It may be added that the strength of the Katona arc-welded joint may be increased where necessary, by increasing the length or thickness of the foot fishplate, and by reinforcing it in various ways; in extreme cases it is possible to add a pair of normal fishplates to the shrunk-on foot fishplate.

Relative Costs

An advantage of arc-welding, as compared with Thermit welding, is that the former can be carried out between trains. The arc-welding gang of five men, equipped with two welding machines and one autogenous burner, is able to complete two welded joints per hour, and with two daily shifts from 40 to 50 joints are welded in a day. The ideal practice in arc-welding, in order to allow adequately for expansion, is found to be the welding of rails into continuous lengths of about 100 m. (328 ft.). Four 24 m. (78 ft. 9 in.) rails are welded together, the remaining 4 m. being taken up by a special expansion device, which consists of two lengths of rail spliced together in such a way as to give a continuous path to the tread of the wheels, but to allow of the free movement of one relatively to the other. This 4 m. length is similarly welded to the 96 m. of continuous running rail on both sides, so that there are actually five welded joints in each 100 m. length. In the centre the 100 m. length of rail is firmly anchored down with six or eight rail anchors, so that the expansion of 50 m. of its length shall take place in one direction, and of the remaining 50 m. in the other direction. Careful calculation shows that, whereas ordinary track, with Vignoles rails weighing 31.5 kg. per m. (62 $\frac{1}{2}$ lb. per yd.), and 4-hole ordinary fishplates, costs 44.67 pengő per m. to lay, the same track with arc-welded Katona joints and welded foot fishplates, together with rail anchors and the expansion device at every 100 m., costs 46.29 pengő per m. If the distance between rail anchors and expansion devices be increased to 150 m., the cost per m. of track is reduced to 44.93 pengő, which is almost identical with that of the ordinary track. The advantage so obtained, with so insignificant an increase in cost, hardly needs to be laboured; joint maintenance is confined to the expansion devices, at every 100 m. or 150 m., and the cost of car maintenance due to oscillation when passing over rail-joints is completely eliminated. We refer to this in an editorial note on page 95.

UNDERGROUND TRAIN WITH PASSENGER-OPERATED PNEUMATIC DOORS.—A new type of all steel train was placed in service yesterday (July 16) on the Hammersmith & City Line. A novel feature is that the doors are opened pneumatically to their full width from both inside and outside the carriages by passengers pressing a large red push button provided with an illuminated sign: "Push to open." Thus only such doors are opened as are necessary, and these are opened to their full width and not, as frequently happens with hand-operated doors, part of the width. As on the tube lines, the doors are closed by the guard; he can also open all the doors should the occasion arise. Other novel features are that only one class of accommodation is provided, and electro-pneumatic brakes are used for the first time on the Hammersmith & City Line.

NEW PORTSMOUTH GOODS DEPOT, SOUTHERN RAILWAY

To serve the Portsmouth area and the Isle of Wight, the Southern Railway has provided a thoroughly up-to-date goods depot at Fratton

ON Monday, July 6, as we announced in our issue of July 3, the new Portsmouth and Southsea goods depot of the Southern Railway at Fratton was opened. In several respects this depot is remarkable. From the plan reproduced in our previous notice it will be obvious that the layout provides liberal and convenient facilities for the transfer of goods between rail and road, and, as we noted at the time, ample warehouse accommodation is also provided for traders who do not wish immediately to take delivery of their goods. The depot has also been arranged in such a way as to permit of its enlargement without interference with current traffic.

The goods shed itself, a steel framed structure on concrete foundations, is one of the largest in the country, measuring 500 ft. long by 135 ft. wide, and its most notable feature is that the roof is carried without any intermediate supports. In order to accomplish this economically, high tensile steel was used to British Standard Specification No. 548/1934. This specification stipulates the limits of carbon, sulphur and phosphorus (0.30, 0.05 and 0.05 respectively), the other constituents being left to the discretion of the manufacturer to give 19.23 tons per sq. in. yield point stresses, according to size, and ultimate stresses between the limits of 37 and 43 tons per sq. in. In designing the roof a stress of tons per sq. in. was worked to, and the tests of the material supplied actually gave yield points up to 28 tons per sq. in.

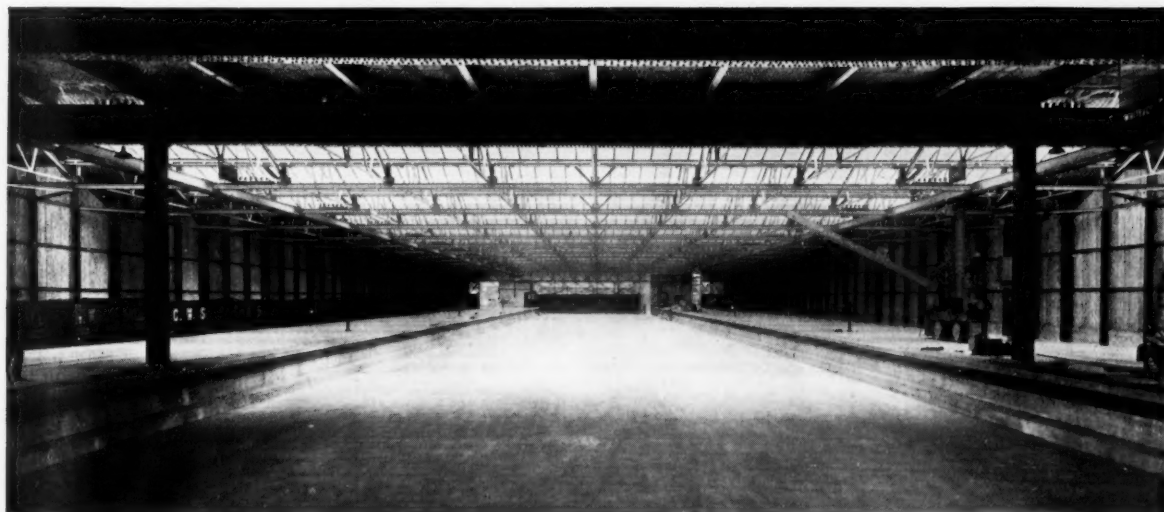
As will be seen from our drawings the main girders are nearly 12 ft. deep, and practically all rolled sections are in high tensile steel, only plates, gussets, cleats, and purlins

(the last-named mainly on account of deflection) being of mild steel. The transport of these large girders, each in five sections, from the yard of the Fairfield Shipbuilding & Engineering Co. Ltd. at Chepstow called for very careful traffic arrangements which worked exactly to schedule and without a hitch. The high tensile steelwork itself was supplied by the Frodingham Iron & Steel Co. Ltd. to the Fairfield Company, who acted as sub-contractor for the supply and erection of the steelwork to G. E. Wallis & Sons, Ltd., of Maidstone, the main contractors for the shed.

The resulting effect of this clear span roof is to give an uninterrupted area for the purpose of goods handling throughout the shed; and the liberal glazing, together with its careful arrangement so as to facilitate cleaning,



The new goods offices at Fratton



Interior of the new Portsmouth goods shed at Fratton, Southern Railway



10-ton travelling electric crane in the yard

results in excellent lighting. The glazing is carried on tee bars and is bedded in Dussek bituminous putty. This part of the work was carried out by Faulkner Greene & Co. Ltd. The rest of the covering is in big six asbestos sheeting.

All the roadways, with the exception of the approach to the yard and places where there is much turning of road vehicles, are surfaced in asphalt, laid hot by the Limmer & Trinidad Lake Asphalt Co. Ltd. The exceptions mentioned are both in granite sets. A feature of the specification for the roadways was that it stipulated depths of formation below the finished surface of the base, thus ensuring effective thicknesses of the foundation and upper surfaces.

Amongst other features resulting from past maintenance experience may be noted the type of dock wall used. It is illustrated in one of our sketches, which shows that granite sets are provided to take the heaviest wear on the platforms, *e.g.*, where wagon and cart flaps are continually dropped on the surface, and that ample fendering is provided. The platforms are covered in concrete, the upper surface of which incorporates Metarock paving, a patent of R. & C. Limited, of London, which gives a very hard wearing effect. Immediately outside the far end of the goods shed is a covered dock with accommodation for eight wagons, four on each side.

On the platforms within the goods shed runs a Morris monorail electric crane, supported by the platform and by girders attached to the roof, thus obviating the necessity for pillars to carry a gantry crane. One of the advantages of this type of crane is that the jib is low enough to enable its end to be inserted into a covered vehicle. In the open goods yard there is a 10-ton Arrol electric travelling crane, a 30-ton truck weighbridge—a feature of which is a by-pass to carry vehicles not requiring weighing—and a cart weighbridge of 20-tons capacity. A special automatic house telephone system connects 35 different points throughout the yard and sheds with the central office.

An efficient lighting system covers both yard and shed. The former is floodlighted from 45 ft. concrete poles equipped with Benjamin Duoflux reflectors with 500 W.

gas-filled lamps, supplemented by similar fittings attached to the shed proper. The shed lighting is by Benjamin R.L.M. reflectors fitted with 200 w. gas-filled lamps and placed so as to avoid shadows and to be clear of the monorail crane jib. The positions of these fittings have been selected so as to permit the use of gaseous discharge lamps at a later date if considered advisable. In order to avoid unnecessary delay in working in case of lighting failure, the whole of the lighting distribution is protected by miniature circuit breakers which can be safely operated by the local staff. In the event of a lamp failure affecting a group of lamps, the lighting can be instantly restored except for the faulty lamp. On the edge of the loading platform concealed watertight switch plugs are provided, into which flexible leads can be plugged so that the inside of covered wagons can be illuminated.

The main offices are situated immediately inside the depot entrance in Goldsmith Avenue, and offices have also been provided for the company's cartage agents, Chaplins Limited, adjoining the goods shed. The design of these buildings, as our illustration shows, gives an unusually pleasing and attractive appearance to the depot, and the internal arrangements are equally attractive in their general efficiency. Up-to-date lighting and central heating have been provided for the staff. One of the features of the offices is the central enquiry office where information with regard to all sides of the company's business is supplied.

The new goods yard has four off-loading sidings, giving accommodation for 220 wagons and served by two 40 ft. cartroads. The goods shed has two 25 ft. platforms and a 59 ft. central cartway serving two sidings each holding 25 wagons. Eight additional marshalling sidings affording accommodation for 227 wagons have also been laid in alongside the yard. The warehouse accommodation is provided by an upper story 100 ft. long at the north end of the goods shed, access to which is provided by an electric lift, a low-stepped staircase and a shoot. The floor area of the warehouse is 13,500 sq. ft., and wooden slat boards are provided to store certain commodities which it would not be advisable to lay direct on the concrete floor. The warehouse is available for letting under either a fixed space arrangement or at tonnage rates. A considerable area in the yard is also available for letting.

The total cost of the depot was £77,000, and the whole of the work has been designed by and carried out under the supervision of Mr. George Ellson, Chief Engineer of the Southern Railway.

EASTERN COACH WORKS.—When in July, 1929, the L.N.E.R. bought a substantial shareholding in the United Automobile Services Limited, one of the assets of that company (in addition, of course, to its extensive motorbus services) was an important coachbuilding establishment at Laundry Lane, Lowestoft. This was transferred to the Eastern Counties Omnibus Co. Ltd. in July, 1931, when that company was formed to amalgamate four railway-associated motorbus businesses, including the East Anglian section of the United Automobile Services Limited; in the merged undertaking both the L.N.E.R. and L.M.S.R. were shareholders. Now, arrangements have been made to segregate the coachbuilding business, and on July 1 Eastern Coach Works Limited was incorporated as a private company with a nominal capital of £100,000 in £1 shares. The directors are Messrs. John F. Heaton, P. G. Stone Clark, J. S. Wills, and W. S. Wreathall. The new company, which is a subsidiary of the Eastern Counties Omnibus Co. Ltd. has Mr. William Bramham as its General Manager, and Mr. R. Prentice as Secretary.

MODIFIED JAPANESE STREAMLINED LOCOMOTIVE

Continuing their experiments, the Japanese Government Railways have placed in service a second streamlined express locomotive

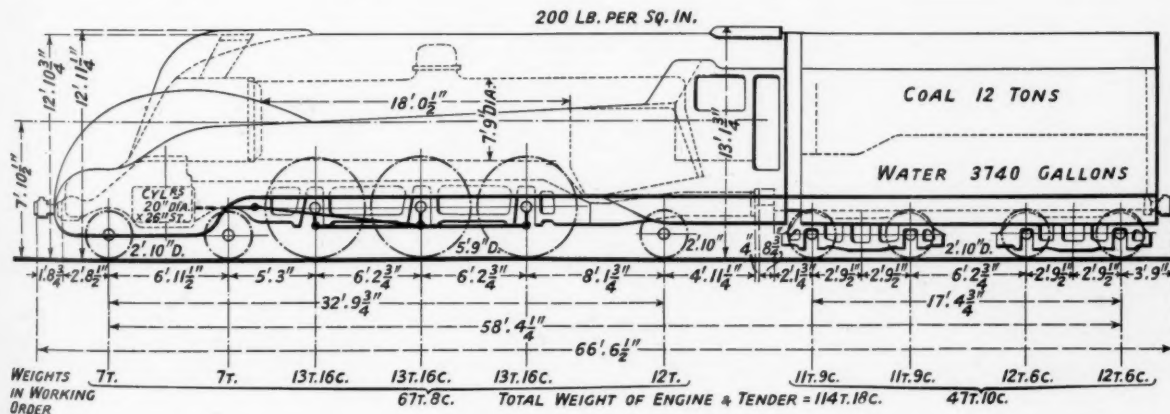
LAST year the Japanese Government Railways rebuilt one of their C-53 class Pacific locomotives with a streamlined casing. After a good deal of experimenting another C-53 Pacific has been streamlined along somewhat different principles, but with the C-55 classification. This second engine is shown in the accompanying illustration. It has two outside cylinders 20 in. diameter by 26 in. stroke which drive the centre pair of 5 ft. 9 in. coupled wheels. The boiler operates at a pressure of 200 lb. per sq. in.; the total evaporative heating surface is 1,361 sq. ft., and the grate area of the round-topped wide firebox, the door of which is operated by compressed air, is 27.2 sq. ft. The superheating surface (18 elements) is 445 sq. ft. In working order the locomotive alone weighs 67 tons, of which 41½ rest on the coupled wheels. The total weight of engine and tender in working order is 115 tons. The tender carries 3,740 gal. of water and 12 tons of coal.

The streamlined cowling extends over engine and tender, but the connecting and coupling rods are open for inspection. The chimney is sloped as shown in the drawing. It is expected that the detailed improvements which have been made in the streamlining and in various mechanical parts will effect an improvement over the

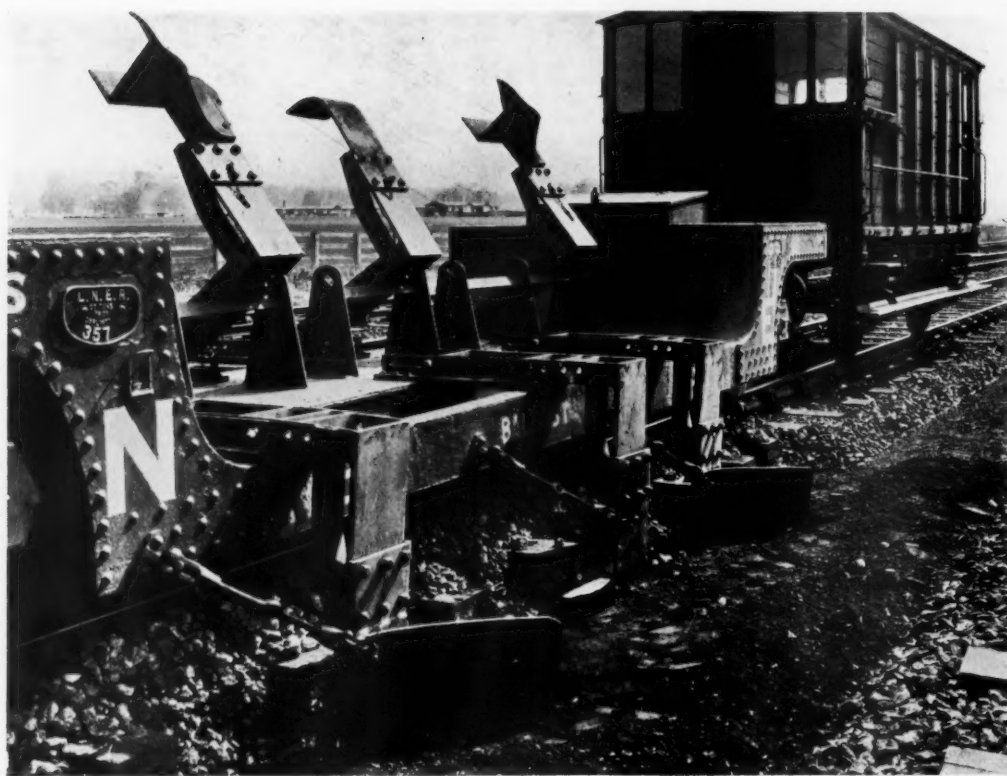


Streamlined 4-6-2 locomotive No. C-5521, Japanese Government Railways, which is now in trial service on the Tokaido route

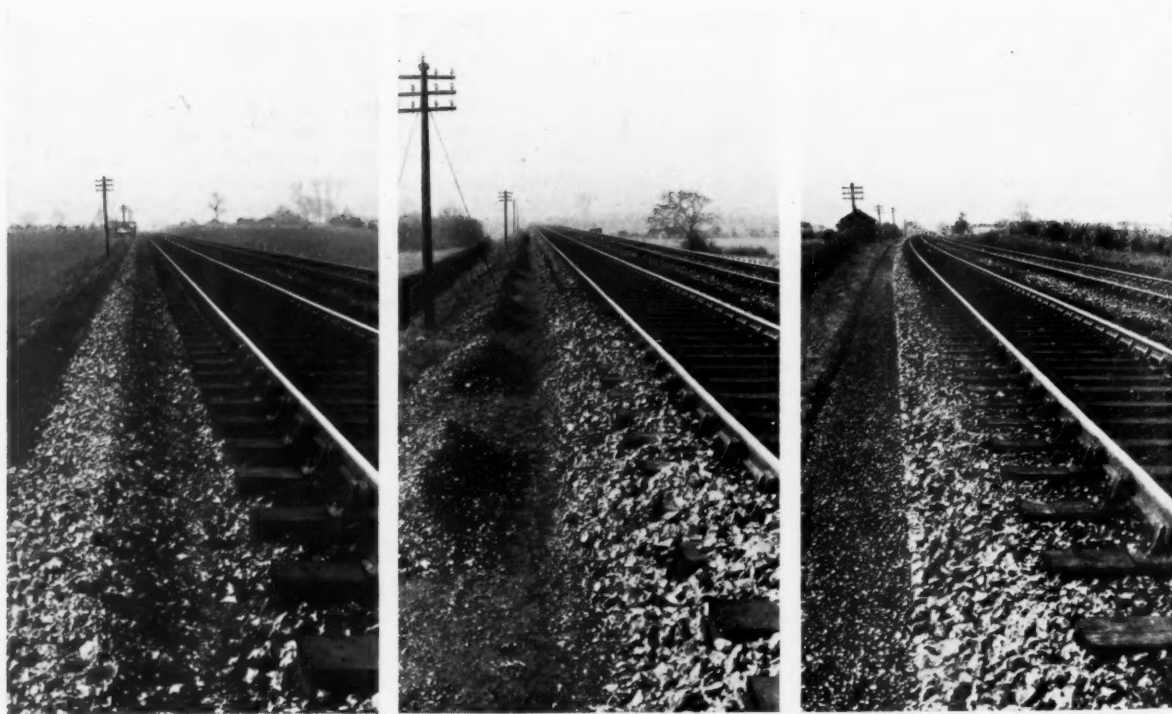
first streamlined engine. Tests with that locomotive last year over the Tokaido main line between Hara and Suzukawa showed that the fuel economy obtained by the decreased air resistance was not sufficient to offset the higher cost of maintenance resulting from the greater difficulty in gaining access to the moving parts and, possibly, to the restriction of the air flow over the various bearings. The second locomotive is now in trial service on the Tokaido route.



General arrangement drawing of C-55 class Japanese streamlined Pacific locomotive with sloped chimney. The cowling extends over engine and tender but leaves the connecting and coupling rods open for inspection



Ballast edge plough in operation



The first illustration shows the ballast thrown out by the passage of the plough; the second, heaps of debris left after ballast has been thrown back; and the third, ballast cleaning completed

BALLAST EDGE PLOUGH, L.N.E.R. (See article at top of opposite page)

BALLAST EDGE PLOUGH, L.N.E.R.

An ingenious device for accelerating ballast cleaning

(See illustrations on opposite page)

THE device shown in the accompanying illustrations provides a quick and economical method of turning out the ballast at the ends of sleepers. The periodical riddling of ballast, whether by hand or mechanical means, is a lengthy process, and this device accelerates at any rate a part of the work. In practice it is found that the ballast shoulder is particularly liable to become choked up, and the removal of the ballast at the ends of the sleepers has an immediately beneficial effect on the drainage of the track.

The plough shown is capable of working at the rate of 4 m.p.h., so that, even allowing for the difficulty of finding a traffic path in many localities, a considerable length of line can be dealt with in a day. The device consists of a leading plough, similarly shaped to the

ordinary agricultural implement, followed by a cutter which gropes beneath the ends of the sleepers. Behind this cutter is a second plough, similar to the leading one. The ploughs work to a depth of 6 in. below the bottom of the sleeper. The wagon set apart for this purpose is fitted with these ploughs on both sides, so that work can be carried out in either direction without turning. When the ploughs are not required to work they are merely turned up to rest on the wagon floor.

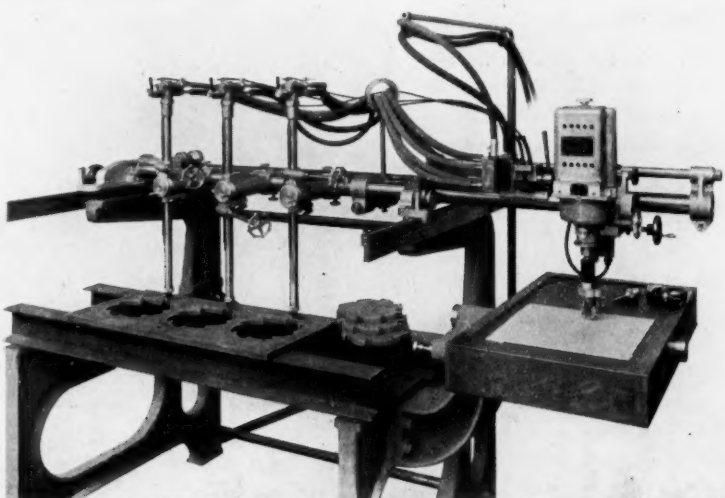
The idea of this plough was initiated and developed by Mr. F. H. Colebrook, Assistant District Engineer at Newcastle, and we are indebted to Mr. John Miller, Engineer, N.E. Area, L.N.E.R., for the above notes. The plough has now been in use for some months on the North Eastern Area of the L.N.E.R. with highly satisfactory results.

New Oxygen Cutting Machine

THE demand for oxygen cutting machines capable of considerably increased output of small or large quantities of reproduction parts has led to the introduction by Hancock & Co. (Engineers) Ltd., Croydon, of a new type of multiple burner cutting machine. This machine, which is illustrated herewith, operates three cutting burners simultaneously from a drawing, a strip metal, or a wooden template, and is fitted with circle and straight cutting attachment. The patented suspension of the moving parts ensures practically frictionless movement with rigid support for the burners, whilst the space which the machine occupies is little more than the area covered by the three burners and template.

The setting up is both speedy and simple. Each burner has independent height, transverse, and longitudinal adjustment and in addition, two or all the burners can be simultaneously moved in a longitudinal direction without moving the electric tracer when running in at the commencement of the cut. All the burners have a single control for both heating and cutting oxygen so that they will start up and stop simultaneously. Stop valves are provided if it is desired to cut out any of the burners.

The electric tracer is of the latest universal pattern fitted with constant speed electric motor a.c. or d.c. with infinitely variable gear for speed control. Interchangeable drives are provided so that the machine can be quickly



Hancock universal simplex triple-head oxygen cutting machine

converted from template to drawing operation or *vice versa*.

Circle and straight line cutting is carried out without templates or guides. The machine has a cutting area for each burner of 24 in. by 12 in. and is designed to cut metal up to 8 in. in thickness. It can, we are informed, be supplied for use with oxy-coal-gas, oxy-acetylene or oxy-hydrogen, and is therefore capable of widespread use under a variety of conditions.

ALKALINE TRAIN-LIGHTING ACCUMULATORS.—When the B.S.I. set up a committee on accumulators in 1928 it was agreed to include both lead-acid and alkaline accumulators within the scope of the work to be undertaken. A

specification for the lead-acid type was prepared first, and issued in 1932 as B.S.S. 454.

During 1934 the committee was enlarged to include manufacturers of alkaline accumulators, and a specifica-

tion for this type was begun, which has now been completed and issued as B.S.S. 683. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.



Left: View, from a photograph by E. O. Hoppé, of the railway station in the Vatican City

Right: First train in Queensland (January 11, 1865) entering Roma Street station yard, Brisbane, on the occasion of the recent railway pageant referred to by our Queensland correspondent on page 103



Left: General view of the new Southern Railway fly-over at Durnsford Road, with trains approaching on the down main and down local lines. The fly-over, which is one of the works in connection with improving the approach to Waterloo station, was described in our issue of May 22

RAILWAY NEWS SECTION

PERSONAL

Mr. R. B. Walker, Traffic Manager of the Midland & Great Northern Joint Railway, is retiring under the age limit at the end of September. His retirement coincides with the modification of the arrangements for working that line outlined upon page 104.

Mr. W. T. Griffiths was, on July 14, elected President of the National Union of Railwaymen, in succession to Mr. J. Henderson, M.P., whose three-year term of office has expired, and who was not eligible for re-election.

Major-General Sir Philip Nash, K.C.M.G., C.B., whose death we recorded in our issue of May 8, left estate valued at £113,238 (£104,718 net).

Mr. F. C. C. M. Fighiera, late Secretary of the Central Argentine Railway, whose death we recorded in our issue of June 5, left estate valued at £18,665 (£11,692 net).

NEW ZEALAND STAFF CHANGES

The Minister of Railways has announced the following changes:—

Mr. H. Valentine, F.R.A.N.Z., Chief Accountant, to be Second Assistant General Manager.

Mr. W. Bishop, A.R.A.N.Z., Assistant Chief Accountant, to be Chief Accountant.

Mr. S. C. Doyle, to be Superintendent, Road Services.

Sir Edward Beatty, G.B.E., K.C., Chairman and President of the Canadian Pacific Railway, has been elected an honorary bencher of the Middle Temple.

Mr. C. E. Spurgeon, Chief Mechanical Engineer, Egyptian State Railways, is at present on leave in England.

We regret to announce the death on July 10 at Hove of Mr. George Swainston Findlay, who had been Assistant Divisional Engineer, Southern Division, Brighton, since April 1, 1927. Mr. Findlay joined the South Eastern and Chatham Railway as Assistant District Engineer at Canterbury on January 5, 1920, and on the reorganisation following the amalgamation became Engineering Assistant to the Divisional Engineer, London East Division, in September, 1923. Mr. Findlay was 47 years of age. The funeral took place at Hove on Tuesday last.

Mr. J. D. Westwood, who, as announced in THE RAILWAY GAZETTE of June 12, has been appointed to act as Agent of the Bengal & North Western and Rohilkund & Kumaon Railways, during the absence of Sir James Williamson on leave preparatory to retirement, was trained and



Mr. J. D. Westwood,

Appointed Agent, Bengal & North Western and Rohilkund and Kumaon Railways (India).

passed the examinations required for admission as a law agent (or solicitor) in Edinburgh, before accepting an appointment on the Bengal & North Western Railway in India as Assistant Traffic Superintendent. He joined his appointment in India in 1906, and throughout his service in India has worked as Assistant or District Traffic Superintendent until promoted to Traffic Manager of the Railway in 1927. In recent years there has been a remarkable growth of the sugar industry in the districts served by the Bengal & North Western Railway, and as Traffic Manager it has fallen to Mr. Westwood to encourage its development in every way. When Sir James Williamson retired in May, Mr. Westwood was appointed to succeed him.

INDIAN RAILWAY STAFF CHANGES

Mr. H. W. Huggins has been appointed to officiate as Deputy Chief Operating Superintendent, N.W.R., as from March 27.

Mr. L. W. Van Someren has been appointed to officiate as Traffic Manager, E.B.R., as from April 17. Mr.

H. W. Meakins has been appointed Officiating Deputy Traffic Manager, Commercial, as from the same date.

Mr. R. W. Taylor has been appointed to officiate as Chief Engineer, E.B.R., as from April 17, and Mr. H. M. Baikie as Deputy Chief Engineer, as from that date.

Mr. H. G. Jones has been appointed to officiate as Deputy Chief Mechanical Engineer (C. & W.), E.I.R., as from April 15.

Mr. C. V. S. Rao has been appointed to officiate as Chief Accounts Officer, Burma Railways, as from April 23, and Mr. T. C. Parker as his Deputy from the same date.

Mr. H. E. Cox, Deputy Chief Engineer, Signals, G.I.P.R., has been granted 7 months' leave as from April 6. Mr. A. Whitney has been appointed to officiate in his place.

Mr. L. F. Jackson, Senior Government Inspector of Railways, Bombay, has been granted two months' leave as from May 3, and has been succeeded by Mr. J. Mackinnon.

Mr. A. O. Evans has been confirmed as Divisional Superintendent, E.I.R.

Sardar Bahadur Ram Singh has been appointed to officiate as Deputy Chief Engineer, N.W.R., as from April 8.

Khan Bahadur Muzaffar Husain has been appointed to officiate as Divisional Superintendent, N.W.R., as from April 16.

Mr. L. Wilson, Agent, G.I.P.R., has been granted 4½ months' leave as from May 18, and Mr. J. H. F. Raper, Chief Traffic Manager, has been appointed to officiate as Agent in his place.

Mr. J. E. M. Rowland has been confirmed as Agent of the Burma Railways.

Mr. A. M. Sims has been appointed to officiate as Deputy Agent, N.W.R., as from April 29.

Mr. C. G. Graham has been appointed to officiate as Deputy Chief Engineer, Maintenance, G.I.P.R., as from May 4, in place of Mr. R. V. Hitchcock, granted 6 months' leave.

Mr. A. R. A. Hare Duke has been appointed to officiate as Controller of

Stores, E.I.R., as from March 27. Mr. J. Scruby has been confirmed as Deputy Chief Engineer, State Railways, as from April 11.

Mr. Nigel Francis Egerton Grey, who, as announced in THE RAILWAY GAZETTE of June 26, has been appointed Secretary of the Buenos Ayres Great Southern and Buenos Ayres Western Railways, was born in 1891 and is the eldest son of Mr. Egerton Spencer Grey, C.B., late Senior Official Receiver in Bankruptcy, and Controller of the Clearing House for Enemy Debts. Mr. N. F. E. Grey was educated at Winchester and Trinity College, Oxford, and served as Lieutenant in the Royal Field Artillery Special Reserve from 1914 to 1919, in France and Flanders. After three years with a firm of export merchants, he was appointed London Export Manager to Leyland Motors Limited, and joined the Buenos Ayres Great Southern Railway in December, 1924, as Assistant Secretary. In March, 1935, Mr. Grey was appointed, in addition, Assistant Secretary of the Buenos Ayres Western Railway. His appointment as Secretary of the Buenos Ayres Great Southern and Buenos Ayres Western Railways dates from May last, when Mr. Robert Graham, his predecessor, assumed the secretaryship of the British-Argentine Railway Committee.

Mr. Harold Scotter Owen, who, as announced in our issue of July 3, has been appointed District Goods Manager, Manchester, L.N.E.R., entered the Secretary's office of the Great Central Railway in 1902. A few years later he was transferred to the General Manager's Department and after gaining experience in the new works and parliamentary sections, was employed



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Mr. N. F. E. Grey,

Appointed Secretary, Buenos Ayres Great Southern and Buenos Ayres Western Railway Companies

on special investigations for the General Manager. In 1908 he was appointed a higher grade clerk and acted as Secretary for the Great Central Railway Higher Grade Scheme, being attached to the Port Master's, Marine, and Stores Departments for the course of training prescribed under that scheme, and afterwards spending several months in the Goods Rates office. In 1912 he was appointed an

Assistant to the District Traffic Manager in Manchester, and later in the same year was transferred to Doncaster as Assistant to the District Superintendent for the Northern (South Yorkshire) District. He was then appointed an Assistant to the General Manager, to deal more particularly with commercial and administrative questions arising out of the opening of the new dock at Immingham. In September, 1914, Mr. Owen joined H.M. Forces, and served first in France with the 2nd Royal Sussex Regiment (1st Division); he rose to the rank of Captain, and was mentioned in despatches for gallantry during the battle of the Somme. In 1917 he was invalided home and transferred to the Royal Engineers, and was afterwards sent to France on the staff of A.D. Transportation, 3rd Army H.Q. During 1917-18 he served as Officer in Charge of the Military Camp Railways in the Southern Command, and on being passed as again fit for service overseas in the latter year, was sent out to Archangel with the North Russian Expeditionary Force, where he was again mentioned in despatches, and was later appointed D.A.D.R.T. at Murmansk. In 1919 he retired from the Army with the rank of Major, and resumed his service on the Great Central Railway. He was transferred in 1923 to Liverpool Street station as an Assistant to the Divisional General Manager, Southern Area, L.N.E.R., on the merging of the Great Central Railway in the L.N.E.R. group. In 1926 Mr. Owen became Assistant to the District Goods Manager for the Manchester District, and in 1928 was appointed Assistant District Goods Manager, Manchester. His promotion occurred in the following year to the position of District Goods and Passen-



Mr. H. S. Owen,

Appointed District Goods Manager, Manchester, L.N.E.R.



Mr. H. Valentine,

Appointed Second Assistant General Manager, New Zealand Government Railways



Mr. W. Bishop,

Appointed Chief Accountant, New Zealand Government Railways

ger Manager. Peterborough, the post he now vacates to become District Goods Manager at Manchester.

Mr. H. Valentine, who, as announced on page 115 in this week's issue, has been appointed Second Assistant General Manager, New Zealand Government Railways, joined the Railway Department as a cadet at Dunedin in 1898. He afterwards occupied various positions in the Otago, Southland, and Canterbury Districts as clerk, Assistant Relieving Officer and Stationmaster until 1920, when he was promoted to the position of clerk in the Chief Accountant's office. In 1922 he was made a Divisional Clerk, and in August, 1924, became Audit Inspector with headquarters at Wellington. Later in the same year he was selected to undertake the financial and accounting reorganisation of the department. He was appointed Chief Accountant as from April 1, 1925, a position he has occupied until the present time. Besides his railway activities Mr. Valentine has taken an active part in the New Zealand Society of Accountants of which he is a Member of the Council and a Past-President.

Mr. W. Bishop, who, as announced earlier in these columns, has been appointed Chief Accountant, New Zealand Government Railways, joined the railways as a cadet at Dunedin in 1901, and was located at various places in the Otago District including Oamaru, Kurow, and Stirling. In 1913 he was appointed Stationmaster at Waitati, and in 1914 Assistant Relieving Officer at Dunedin. In the following year he was made a clerk in the District Traffic Manager's office there, and in 1920 was transferred to a similar position at Wanganui. In 1924 he was appointed as clerk in the head office at Wellington, and in 1926 became Supervising Accountant in the Chief Accountant's office. In April, 1927, he became Assistant Chief Accountant, and has continued in that position until his recent appointment as Chief Accountant. Mr. Bishop is a qualified accountant and a member of the New Zealand Society of Accountants. He was associated with Mr. Valentine in the financial and accounting reorganisation of the department from 1924 onwards.

Mr. W. Davidson retired recently from the position of Engineering Assistant, Newhaven Harbour, Southern Railway, after 34 years' service with the L.B.S.C. and Southern Railways, the last 15 of which were as Resident Engineer in charge of Newhaven harbour works and Newhaven and Seaford sea defences.

On behalf of his colleagues past and present, Mr. Davidson was presented with a set of golf clubs and a silver entrée dish. In making the presentation Mr. G. Ellison, Chief Engineer, paid tribute to Mr. Davidson's watchfulness and successful work in combating frequent storm damages.

Accidents on British Railways

(See also editorial article on page 96)

The annual report of Lt.-Col. A. H. L. Mount, the Chief Inspecting Officer of Railways, Ministry of Transport, which was published this week, shows that last year the liability among passengers to casualty in train accidents was one killed in every 130 millions carried, and one injured in every four millions. In the case of railway servants the passenger and freight miles worked were about 62 millions a fatality, and five millions an injury. Casualties at public road level crossings including killed and injured amounted roughly to one for each 100 crossings.

Accidents occurring during 1935 are arranged under three headings: Train; movement; and non-movement. In train accidents the numbers of passengers killed and injured were 13 and 408 respectively. The 13 deaths occurred in one accident (the collision at Welwyn Garden City) and the number compares with the annual average of 7 for the previous five years. The cases of injury show an appreciable decrease compared with the previous year's figures (537) and fall below the average (467) for the five years.

Five cases of train accident were attended by loss of life among railway servants. The total casualties in such accidents were 7 killed and 81 injured which compares with 12 killed and 96 injured in the previous year, and are also below the average for the previous five years (9 killed and 84 injured).

Of the train accidents which occurred last year 19 were the subject of formal inquiry, and the report refers to the main features of these accidents, to the methods available for prevention and to the measures which have been, or are being, taken to prevent recurrence.

Movement Accidents

In movement accidents, which are described as accidents caused by or connected with the movement of railway vehicles exclusive of train accidents, 84 passengers were killed and 4,517 injured. These figures are considerably above the average and include the following:—

	Killed	Injured
Attempting to enter or alight from trains...	14	1,495
Falling off platforms and being struck by trains...	10	6
By the opening and closing of carriage doors at stations...	—	2,231
Falling out of carriages during running of trains...	36	25

The bulk of these accidents, it is stated, are due to misadventure, or are caused by want of caution, or misconduct, on the part of passengers concerned. With regard to casualties which occurred in attempting to enter or alight, most of these cases occurred when trains were moving and when passengers were themselves to blame. The injuries occasioned by the opening and closing of carriage doors were

chiefly to fingers, due to lack of caution or misadventure, and the numbers are rising. Casualties caused by falling out of carriages were 6 fewer than in 1934 but slightly more than the annual average for the period 1930—1934; they included 21 children. The liability to accident of this kind during 1935 was one in about 28 million passenger journeys (including those made by season ticket holders). Many such accidents occurred through doors becoming unfastened owing to interference on the part of passengers.

Among servants of the companies and contractors, the casualties in movement accidents were 165 killed and 2,436 injured. The total, 2,601, is slightly more than the previous year, but fatalities show a decrease of 39. Of the 391 formal inquiries held into accidents to personnel, 330 were in the movement class.

Level Crossings

In 210 accidents at level crossings, 51 persons were killed and 51 injured, including 48 pedestrians, of whom 39 were killed and nine injured. The figures are a little higher than the average for the five-year period 1930—1934.

All road users of occupation crossings are reminded that not only their own safety, but often the safety of rail traffic, depends entirely upon the care with which they traverse the railway, and highway authorities should continue to bear in mind the desirability of providing adequate warning notices to road users on approaches to public road crossings.

In both train and movement accidents the casualties among passengers, servants and other persons totalled 335 killed and 7,563 injured. The number of fatalities is one less than the previous year and compares with an annual average for the period 1930—1934 of 308, while the injured total also slightly exceeds the average for this period (7,132).

The report concludes with a reference to the high standard of safety which is being maintained, but directs attention to two features: the rise in the number of passenger fatalities in movement accidents, and the risks attending shunting and the presence of workmen on the line. As means of reducing these accidents, the report suggests an extension of existing warning propaganda in the case of the former, and the maintenance of educational endeavour with regard to accidents to railway servants.

CENTENARY OF ARC DE TRIOMPHE.—Celebrations will take place in Paris this month to commemorate the inauguration of the Arc de Triomphe by King Louis Philippe on July 29, 1836.

Railway Developments in Asiatic Turkey

(See editorial note on page 95)

In our issue of August 17, 1934, we outlined the railway developments in Asiatic Turkey during the preceding ten years, and the present notes are designed to bring the position up to date. In addition the Turkish Minister of Public Works recently announced in the National Assembly at Ankara some interesting details of plans for railway construction in Turkey included in the current financial year's programme, so it is now possible to indicate how far previously-announced schemes are being modified (and in some cases accelerated) in practice.

The Sivas-Erzurum Line

The most important line now under construction is that from Sivas via Erzingan to Erzurum, intended to pass through the chief province of Turkey, Anatolia, from west to east, with a length of 553 km. (344 miles) and provide an outlet for export, now almost entirely lacking, for the agricultural products of the rich eastern districts through the ports of the country. At the same time a connection will be made with the Russian railway system and, through Tiflis, with the Iran line from Julfa to Tabriz. The Euphrates will be crossed at km. 209 from Sivas. Crossing the Pingan pass necessitates numerous tunnels and viaducts.

Heavy engineering works are frequently to be found on the new Turkish railways. The total costs of the Sivas to Erzurum section are put at £42 million Turkish, or £T.67,000 a kilometre, and will be covered by an internal loan where present funds do not suffice. The schedule was for the track to be completed to km. 177 (110 miles) in 1936; to km. 234 (145 miles) in 1937; to km. 338 (210 miles) at Erzingan in 1938; and the whole line finished in 1940. Hitherto work has been going on from Sivas only,

but the Minister of Public Works has now stated that as work has lately been undertaken from the Erzurum end, and the National Assembly has voted the necessary money for the work, it will be possible to have this section ready by the middle of 1939. The line is expected to reach Erzingan in August or September, 1938.

A line runs from the Russian station of Alexandropol (Leninakan) to Sarikamish, 135 km. (84 miles) on the 5 ft. gauge. Thence to Erzurum the Russians built a narrow gauge line during the war, which at present continues westward of that town for 60 km. (37.3 miles) to Maden Yenikoy. It is said that this will be used to bring material from Russia for the building of the new railway, enabling costs to be reduced appreciably.

The branch, 140 km. (87 miles) long, to Malatia, will not only shorten the route from Diarbekr to Istanbul, as compared with the present route via Adana, by some 200 km., but will also connect by the shortest route the important line from Fevzipasa through Malatia to Diarbekr with Inner Anatolia and the Turkish Black Sea port of Samsun. This is to be constructed for 60 km. (37.3 miles) from Malatia this year and the through connection to Sivas should be completed next year.

Fevzipasa to Diarbekr

The Fevzipasa and Diarbekr line, built as far as the River Euphrates by the Swedish combine, was completed across the river at km. 283 in 1934, reached the important provincial town of Mamuret El Aziz on August 10, 1934, was extended to Argana (Ergani Maden) a year later, and completed to Diarbekr on November 22, 1935. A rich source of copper exists at the latter place, the profitable working of which was found possible by German

experts during the war. For some time the equipment for transporting the copper ore has been engaging the attention of the Turkish authorities. Diarbekr is not only the seat of the Governor of the Eastern Provinces but also a centre for trade with Iraq.

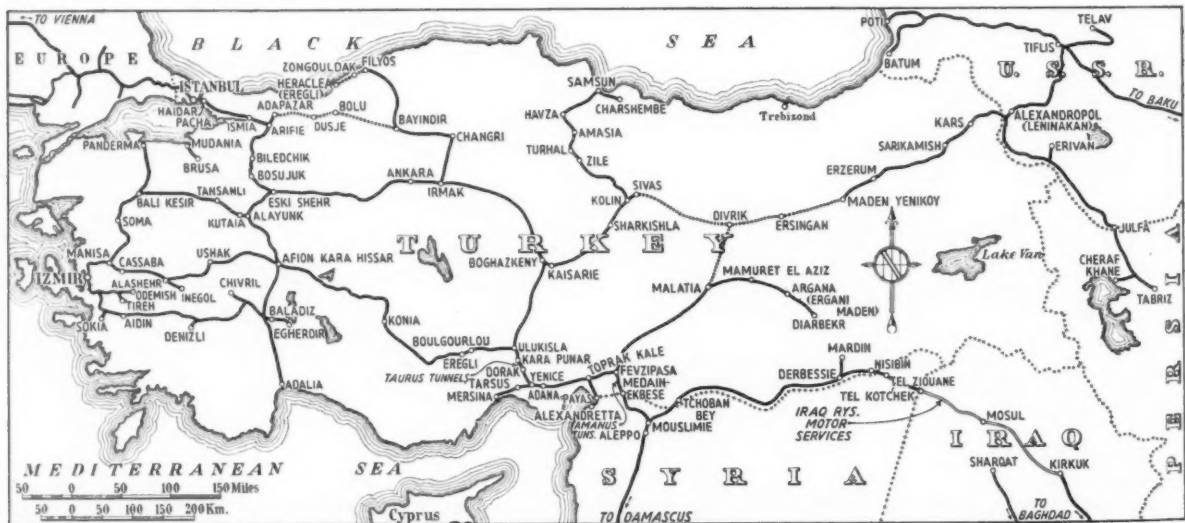
The costs of this 506 km. (314.4 mile) line have come to about £T.60 million, or £T.119,000 a km. They are not excessive considering there are 64 tunnels of a total length of 13,609 m. (14,883 yd.) and other heavy works, including large bridges across the Euphrates and Tigris rivers.

Marmora to Mediterranean

In the south the first part of the line from Afion Kara Hissar to Adalia was opened to Sandikli on October 12, 1935, and finished in April of the present year. Branches to Isparta, 13 km. (8 miles) and Burdur, 24 km. (15 miles) are to be made. This railway completes a north-south connection from the Sea of Marmora to the port of Adalia on the Mediterranean. It provides a new outlet for the country around Egheerdir and probably had considerable influence on the sale of the Smyrna-Aidin Railway to the Turkish Government as from June 1, 1935.

Serving the Zongouldak Coalfield

The formal opening ceremony of the Filyos to Irmak line, 240 km. (149 miles) took place on November 13, 1935. Work is now in progress on the railway from Filyos to Zongouldak along the coast. Some 13 km. is to be ready in 1936, taking it as far as Catalagzi, which lies in the coal basin. It is thus expected that deliveries of Turkish coal will this year be reaching the capital by rail. Beyond Catalagzi, however, serious technical difficulties are likely to be encountered; in particular, a large number of tunnels will have to be built. Nevertheless, the railway will probably reach Zongouldak in 1937.



Sketch map of the railways of Turkey in Asia showing, with a broken line, railways proposed or under construction

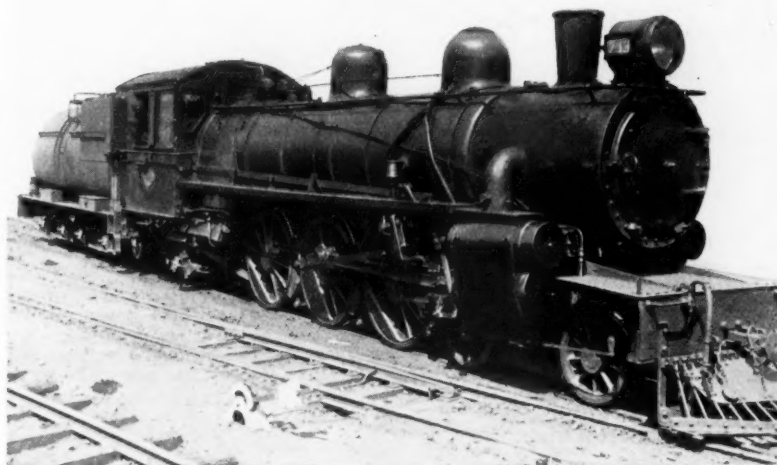
Locomotive Performance in New Zealand

In various past issues of THE RAILWAY GAZETTE reference has been made to fast running over the 3 ft. 6 in. gauge tracks of the railways of Japan, Java and South Africa, the most recent of these in the October 25, 1935, issue, where a description was given of a test run with one of the latest South African 4-8-2 locomotives of Class 19C; this engine, with a load of 131 tons, surmounted lengthy 1 in 80 gradients at a sustained speed of 59 m.p.h., and attained a maximum speed of 67 m.p.h. over favourable gradients. New Zealand is another country in which locomotive performance over the 3 ft. 6 in. gauge is of a high order, and especially that of the Ab class Pacifics, which are of but moderate dimensions in comparison with the large South African Mountain type engines just referred to. The New Zealand Ab 4-6-2's have 4 ft. 6 in. driving wheels, 17 in. x 26 in. cylinders, a heating surface (including superheater) of 1,331 sq. ft., 33 sq. ft. of firegrate, 180 lb. pressure, 21,230 lb. tractive effort (at 85 per cent. working pressure), and only 30 tons adhesion out of an engine weight of 52 tons. Engine and tender in running trim weigh 84½ tons. Larger 4-8-2 and 4-8-4 locomotives are now available for the principal passenger service, but the fact that no fewer than 141 of the Ab class engines were built, together with thirty of the WAb 4-6-4 tanks (identical with the Pacifics but for the provision of a rear coal bunker and side tanks in place of a separate tender), out of a total of no more than 400 locomotives of thirty different classes, speaks well for the popularity of the former engines.

A recent issue of the *Railway Circle Record* of South Africa gave some interesting details of the work of the New Zealand Pacifics, as recorded by members of the Railway Circle when travelling in the latter country. Some of the fastest New Zealand running takes place on the South Island, where the line crosses the Canterbury Plains between Christchurch and Dunedin, and skirts the sea for some distance. On a typical run behind Pacific No. 732, with an eleven-car train totalling 290 tons (New Zealand stock is relatively light), 15 consecutive miles between Rangitata and Ashburton were covered in 16 min. 56 sec. (average 53.1 m.p.h.), and five of these at 56.3 m.p.h., with a maximum of exactly 60 m.p.h. With a heavier train of 14 coaches (345 tons in all), Pacific No. 809 ran 30 miles between Rakaia and Addington in 36 min. 33 sec. (49.3 m.p.h.), and a start-to-stop average of 43.5 m.p.h. was maintained over the 35.5 miles from Rakaia into Christchurch, with a maximum of 57 m.p.h. In the opposite direction, with 4-6-2 No. 813 and 280 tons, after a

late start from Rakaia, the 16½ miles from Rakaia to Ashburton were run in 21 min. 28 sec.; the start-to-stop average in this case was 46.8 m.p.h., and the maximum speed 56½ m.p.h., 6½ min. being gained on the schedule between these points. The ensuing 11½ miles to Hinds, allowed 18 min., were covered in 15 min. 58 sec., at 44.2

m.p.h., seven miles being covered at an average of 52 m.p.h. During the entire run of 100 miles from Christchurch to Timaru the engine ran some 23 miles in all at speeds of 50 m.p.h. and over. Many similar experiences might be quoted, but it seems clear from the foregoing that with reasonable loads the Ab Pacifics in New Zealand could put up performances but little, if at all, inferior to those of the fastest trains of Java and Japan, should circumstances require it.



"Ab" class Pacific type locomotive, New Zealand Government Railways

Empire Exhibition (South Africa), 1936

At the invitation of the Comptroller General of the Department of Overseas Trade, we were able to hear the views of the South African Trade Commissioner in London, and of the Commissioner of the United Kingdom Pavilion, upon the exhibition, at an informal meeting on Wednesday in the offices of the department. Sir Edward Crowe, the Comptroller, presiding, stressed the value of the exhibition in the cause of unity of Empire, and stated that, for the first time in history, South Africa was now the largest purchaser of United Kingdom goods. He also reminded his hearers that in 1935 the U.K. took 78 per cent. of the Union exports.

The Union Trade Commissioner explained that these facts were the more remarkable as the white population of South Africa was only 2,000,000 and the purchasing capacity of the native population equal only to another 2,000,000 whites. Union exports of staple commodities to the U.K. were declining. He hoped, therefore, that manufacturers and traders in Great Britain would make a special effort to reciprocate and take more South African goods in future.

Mr. Claud Taylor, the U.K. Pavilion Commissioner, described the exhibition

as over half the size of the Wembley exhibition and having as many pavilions. The U.K. Pavilion, which was 90 ft. in height, had, he said, as its central feature a map of the world more than half the size of a tennis court on which the sea was represented by real water on which moved many ships. The main theme of the pavilion was the story of Empire communications. Over the map flew the actual plane flown by Mrs. Mollison on her recent record flight to South Africa and back, and around it were panoramas of the development of various forms of transport in Great Britain.

Foremost among these was one representing railway transport, with which were 1 in. to a foot models of the *Rocket* and its original train (1829), one of Kirtley's six-coupled Midland engines, a Sterling Great Northern express locomotive, an Adams 4-4-0 L.S.W.R. engine, Stanier's Pacific *Princess Royal*, L.M.S.R., and *Silver Link*, the first streamlined Gresley L.N.E.R. Pacific.

Other panoramas depicted similar stages in shipping, motor, and air development; the final shipping model was of the *Queen Mary*, 11 ft. in length. Mr. Taylor also described the unique royal dais in the pavilion.

Railway Staff and Labour Matters

The Railway Staff National Tribunal assembled at the Ministry of Labour, Whitehall, on Wednesday morning, July 15, to begin the hearing of the wages claim of the National Union of Railwaymen and the Railway Clerks' Association. The progress of these claims through the lower stages of the agreed machinery of negotiation has already been reported in these notes, and the constitution of the tribunal and the method of appointing the chairman were recorded on page 65 of last week's issue.

A special provision is contained in the machinery in regard to the hearing of claims, namely, that "Hearings before the Railway Staff National Tribunal shall be private to the parties unless otherwise agreed by the parties or, failing agreement, unless otherwise decided by the tribunal." The parties had agreed that the present claims should begin in public and this decision had given special satisfaction.

The first day's proceedings are described in the following notes.

Room No. 10 at Montagu House was well filled as the members of the tribunal took their seats at a horseshoe table. Sir Arthur Salter, K.C.B., D.C.L., the Chairman, had on his right Mr. A. L. Ayre, O.B.E., J.P., the independent member nominated by the railway companies, with Sir Ralph Wedgwood and Mr. G. L. Darbyshire, the two assessors nominated by the railway companies. On Sir Arthur's left sat Mr. J. W. Bowen, J.P., the independent member nominated by the railway trade unions, with Messrs. J. Henderson, J.P., M.P., and F. B. Simpson, M.P., presidents of the unions sitting as assessors.

The introduction of assessors is something new in proceedings of this kind. Their function is to assist the tribunal, but they may not intervene in the proceedings other than to put questions through the Chairman for the purpose of elucidating matters of fact. In the private deliberations of the tribunal they advise upon such matters as may be required of them by the tribunal, but they do not sign the decisions.

The General Secretaries of the National Union of Railwaymen and the Railway Clerks' Association (Messrs. John Marchbank and W. Stott) took their places to present the cases of their unions, and by their side sat Mr. Kenelm Kerr, the advocate for the railway companies, with his assistants surrounded by piles of books and papers. Immediately behind were Sir Herbert Walker, Mr. W. V. Wood, and Sir James Milne, with other representatives of the companies, and behind them members of the public who had come to witness the beginning of this important arbitration case—the first to be heard by the new tribunal.

The Chairman made an introductory statement concerning the agreement under which the tribunal is established and expressed the hope that the conclusion of their discussion might promote industrial peace. He then called on Mr. C. F. Walters, the Secretary to the tribunal to read the terms of reference in which the parties ask the tribunal to hear and decide the following claims:—

By the National Union of Railwaymen

(a) Termination of the percentage deduction from earnings at present operating under the agreement of August 10, 1934.

(b) Restoration of the standard rates of payment in operation prior to National Wages Board Decision No. 119 for overtime, night duty, and Sunday duty.

By the Railway Clerks' Association

Termination of the percentage deduction from earnings at present operating under the agreement of August 10, 1934.

After a few formalities, Mr. Marchbank rose to open the case of his union, and spoke slowly and carefully from prepared notes. He outlined the history of the negotiations leading up to the present hearing, and described the various groups of staff covered by the claim. Reference followed to various agreements and awards, to returns published by the Ministry of Transport, and to the companies' revenues, for Mr. Marchbank realised that this was a new tribunal hearing its first big case.

The Chairman then intervened to ask for an explanation of the term "Net Revenue," which was promptly given by Mr. Kenelm Kerr.

When Mr. Marchbank had put in a number of tables, he began to attempt to show that the loss in earnings due to the existing wage cuts bore hardly upon the staff. He cited individual cases and then referred to the conditions which prevailed during 1931 when there was an "economic blizzard." "Men have been patient," he said, but he claimed that the wage cuts had lasted too long and referred to wage restorations which had taken place in other undertakings.

During the afternoon Mr. Marchbank continued his speech and expressed the view that substantial benefits would accrue to the railway companies in respect of the House of Lords decision on the Southern Railway Rating Assessment case, although he recognised that some time might have to elapse before those benefits actually materialised. He dealt with a variety of matters—of promotions, removals, of reserves and renewal funds, of engine mileage, and references to rates paid pre-war in respect of certain conditions of service. Mr. Marchbank argued that the railway wage cuts made in March, 1931, were temporary and that the necessity for the cuts had entirely

passed, especially having regard to the improved revenues of the companies, and he concluded with an eloquent appeal to the tribunal to concede the claims he had advanced.

Soon after four o'clock Mr. Stott rose to open the case for the Railway Clerks' Association. His case is not complicated as was Mr. Marchbank's by the need for dealing with conditions of service, and, although he had but little time at his disposal that afternoon, he gave the impression that he hoped to complete the presentation of a competent case to the tribunal on the morrow (Thursday). When he has finished, it will be the turn of the railway companies' advocate.

Intensive Suburban Service

At a recent meeting of the Calcutta branch of the Institution of Locomotive Engineers, Mr. D. MacAulay, District Locomotive Superintendent Eastern Bengal Railway, delivered an illustrated address on certain aspects of working steam-operated suburban services with particular reference to such services on the E.B.R. in the Calcutta area, which are heavy. He said that the service was satisfactorily maintained during the rush hours, but during the slack hours of the day it was poor, and the needs of the travelling public were largely met by main line trains stopping at all suburban stations. These trains accordingly recorded slow booked speeds. Since the introduction of intensive suburban services in January, 1934, the average over-all speed of suburban trains had risen from 19.9 m.p.h. in December, 1933, to 22.0 m.p.h. in November, 1935, one of which any railway might be proud. Although a great many improvements and alterations could and would be effected in the near future, those carried out in 1934 had definitely attracted more passengers to the railway and had made the E.B.R. local trains formidable competitors of road transport. In fact, the buses on one route stopped running shortly after the intensive service was introduced. The Statistical Officer of the railway recorded an increase of 234,629 passengers travelling during April, May and June, 1935, compared with the same period for 1933, and attributed this mainly to the intensive service.

Mr. MacAulay also described the mechanical features of working such an intensive suburban service and mentioned the difficulties experienced and the mechanical defects that occasionally developed with the classes of locomotive employed. He concluded by saying that the E.B.R. suburban train speeds compared very favourably with those of the G.I.P. electric trains.

In the technical discussion that followed, emphasis was laid on the necessity of correlating operating results with the traffic offering, since the financial aspect of intensification depends largely on its introduction.

Ronald's Electric Telegraph

Although the trials made with their electric telegraph by Cooke and Wheatstone in 1837 between Euston and Camden, followed two years later by the installation on the Great Western Railway, mark the beginning of practical electric telegraphy in this country, it is of interest to recall that another inventor, Francis Ronald, had been active in the field some twenty years before. He lived in a house near the river Thames, not far from where is now the north end of Hammersmith bridge, and conducted extensive experiments in his garden; here he erected as much as eight miles of insulated wire and buried many hundreds of feet in a trench 4 ft. deep. The overhead wires were suspended from trees and poles by silk carrier ropes and the underground ones were laid in thick glass tubes, carried in wooden troughs filled with pitch. This was in 1816, but Ronald did not publish an account of his ideas until 1823.

Ronald probably knew little or nothing of electricity derived from batteries, the voltaic cell having been discovered by Volta only in 1800, and he therefore employed frictional, or static, electricity, which from its high voltage and ease of rapid discharge was little suited to telegraphic communication. Telegraphs using frictional electricity had been proposed on the Continent by Lomond in 1787, Reizen in 1794, and Salva in 1798. After the invention of the battery by Volta, Sömmering made an electro-chemical telegraph in 1809, but the manipulation was extremely cumbersome and a wire was required for each letter or sign to be transmitted, an impracticable arrangement. The galvanometer needle, the basis of Cooke and Wheatstone's invention, was not known till the discoveries of Oersted in 1819.

Ronald's apparatus consisted of a frictional electrical machine at each station, connected to the line circuit or earth, at will, together with a small gas charged pop-gun (the discharge of which called the operator's attention), a pith ball electrometer, and a special clock. The last named was constructed so as to rotate a dial plate, on which were inscribed letters, numbers, and some conventional signs, behind a fixed dial with an opening in it, through which the inscriptions accordingly appeared in succession. The clocks at the transmitting and receiving stations were set going synchronously at the commencement of a message, a conventional signal being used to enable the operators to make sure that this was taking place, so that the same sign was visible at both places at any given instant. The message was sent by charging the circuit from the frictional machine, which caused the pith ball electrometers to diverge. Immediately the sign intended appeared at the opening in the dial the

transmitting operator earthed the circuit by means of a chain, causing the electrometers to collapse, whereupon the receiving operator noted down the sign visible on his clock and recharged the wire in acknowledgement. The spelling of words was necessarily tedious, but by using code groups of letters or numbers and a signal book as was already the custom with visual semaphore telegraphs, the time taken to send a message could be greatly reduced.

The use of underground wires in preference to pole lines was strongly advocated by Ronald, who said: "The liability of the subterranean part of the apparatus to be injured by an enemy or mischievously disposed persons has been vehemently objected to—more vehemently than rationally, I presume to hope, as is not infrequently the case on these occasions. If an enemy had occupation of all the roads which covered the wires, he could undoubtedly disconcert my electric signs without difficulty; but would those now in use escape? And this case relates only to invasions and civil war; therefore let us have

smokers enough to prevent invasions and kings who love their subjects enough to prevent civil wars. To protect the apparatus from mischievously disposed persons, let the tubes be buried 6 ft. below the surface of the high roads and let each tube take a different route to arrive at the same place. Could any number of rogues then open trenches 6 ft. deep, in two or more different public high roads or streets, and get through two or more strong cast iron troughs, in less space of time than forty minutes? For we shall presently see that they would be detected before the expiration of that time. If they could, render their difficulties greater by cutting the trench deeper and should they still succeed in breaking the communication by these means, hang them if you catch them, damn them if you cannot, and mend it immediately in both cases."

Ronald brought his telegraph to the notice of the Admiralty who informed him that "no other than the (visual) one in use would be adopted." He also invented a device for keeping a continuous record of the electrical state of the atmosphere with a view to studying the frequency and force of thunderstorms in various localities.

U.S.A. Railways Upheld in Pensions Litigation

The Federal District Court in Washington, D.C., has, in answer to the railways' appeal, enjoined the collection of taxes (3½ per cent. of wages on the employees and a like levy on the railways) imposed to provide funds for the payment of pensions. It did not enjoin the payment of pensions, however, and the law still stands requiring retirement by employees at the age of 65, under penalty of losing part of their annuities if they continue to work beyond that age. The litigation will now be carried to the Supreme Court of the United States, where a final decision can scarcely be expected before December. Employees over 65 are thus placed in a dilemma. If they continue working and the pension law

is upheld, their annuities will be reduced. If, on the other hand, they retire now and the Court declares the law unconstitutional, they may find themselves without pensions and without employment.

The whole pension situation is rapidly becoming most distressing. Most of the railways had their own pension plans before legislation on the matter was enacted three years ago. Since that time, pending the outcome of this legislation, few new pensions have been granted, and many men remain in service whom the railway managements themselves, without any compulsion from the unions, would gladly have retired, but for this legislative uncertainty.

RAILWAY STEAMER IN A FILM.—The Dumbarton & Balloch Joint Railway (L.M.S.R. and L.N.E.R.) Loch Lomond steamer *Princess Patricia* was hired by a film company last week for shooting certain outdoor scenes in the film "Spy of Napoleon." The Scottish loch was represented in the story as Lake Geneva, and the *Princess Patricia* became *La Princesse* for film purposes. The regular crew of the vessel (including the captain) temporarily forsook their D. & B.J. R. gold braid and jerseys for the costume of French sailors of the Napoleonic period, and the railway house flag at the masthead was replaced by the tricolour. The action took place between Luss and Tarbet, and these piers were renamed Thonon and Geneve respectively. Richard Barthel-

mess and Dolly Haas were the stars. The *Princess Patricia* is the smallest of the Loch Lomond paddle steamers and is normally engaged on short cruises from Balloch.

ERITREAN TELPHER LINE.—Italian troops are building a cable-suspension railway to connect Massawah and Asmara, with a difference in level of 7,900 ft. The total length of the line will be about 45 miles. A 17-mile section out of Asmara is now in operation, and the next 14 miles from Saati to Ghinda is under construction. The final section from Saati to Massawah is being surveyed. The capacity of the line is about 700 tonnes a day, and the speed 6 m.p.h.

NOTES AND NEWS

Sir Nigel Gresley.—On Wednesday the King conferred the honour of knighthood upon Mr., now Sir, Nigel Gresley, Chief Mechanical Engineer, L.N.E.R.

New Italian Colonial Railway.—A 41-mile 950 mm.-gauge line running inland from the port of Mogadiscio, in Italian Somaliland, has been opened to public traffic. Most of it was built by the army of General Graziani. A 30-mile branch is being constructed to Villaggio Duke of Abruzzi.

Feeding London's Millions.—The following estimated figures show some of the quantities of foodstuffs arriving in Central London by railway freight services during a year: fruit and vegetables, 256,650 tons; meat and poultry, 114,350 tons; fish, 217,700 tons; potatoes, 300,000 tons; and milk, 108,229,000 gallons.

Safety on New South Wales Railways.—Official statistics just issued in Sydney show that during the past 10 years the New South Wales Government Railways, though they have carried 145,000,000 passengers on an average every year during that period, can claim that they have done so without a single passenger fatality caused by railway working.

Threatened Indian Railway Strike.—The pressure that is being exerted upon the Indian Railway Board towards even greater economies threatens the discharge of 4,000 employees. The All-India Railwaymen's Federation has now demanded a court of enquiry under the Trades Disputes Act into the matters of reduction of staff and wages, and has called on the workers to prepare for a strike, failing the obtaining of satisfaction by conciliation.

Southdown Motor Services Limited.—Meetings of the Southdown Motor Services Limited have been convened for July 30 to consider resolutions authorising the directors to distribute to the shareholders a bonus of two new ordinary shares of £1 each, fully paid, for each three existing ordinary shares. The proposals for converting the 1s. shares into £1 shares will be submitted to separate meetings of the holders of the £1 and 1s. shares before being submitted to the meeting of the company.

New London Local Timetables.—To meet a demand for local (as apart from area) timetables of pocket size, the London Passenger Transport Board has arranged to publish a series of 42 monthly booklets, each 5½ in. by 3½ in., and price 2d. The first half dozen of the series, just issued, deal with Windsor (and Slough), Beaconsfield, Gerrards Cross, Hayes, Uxbridge, and High Wycombe. Each contains timetables and maps for all local buses, trams, Green Line coaches, and railway services to London and other neighbouring towns. Also, there are street plans of

the central part of the towns through which the services run and other district information.

Institute of Metals Meeting in Paris.—The twenty-eighth autumn meeting of the Institute of Metals will be held in Paris from September 14 to 18, by the invitation of the Bureau International des Applications de l'Aluminium with the co-operation of the Chambre Syndicale des Métaux à Paris.

U.S.A. Locomotives.—According to Mr. Robert S. Binkerd, Vice-President of the Baldwin Locomotive Works, 92 per cent. of 45,500 locomotives on the Class I railroads of the U.S.A. are more than 10 years old, 62 per cent. are more than 20 years old, and about 22 per cent. are in need of heavy repairs.

Fire at Keith Blackman Offices.—James Keith & Blackman Co. Ltd., whose offices in Farringdon Street, E.C.4, were involved in a fire on Tuesday night, has intimated that, although there may be some little delay in dealing with correspondence, production at the Holloway works will be unaffected.

Protective Glasses for Industrial Operations.—In view of the rapidly increasing use of welding, the necessity for ensuring that the protective glasses used do, in fact, give adequate protection to the operators is one of importance, and a British Standard Specification for such glasses has just been issued, copies of which (B.S.S. No. 679-1936) may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

Brighter L.N.E.R. Stations in Scotland.—In pursuance of its policy of smartening up stations, the L.N.E.R. has recently awarded contracts for the cleaning and painting of a number of stations in Scotland. Harley & Co. of Tayport has been entrusted with the work at St. Andrews; Burgess & Son of Helensburgh is undertaking the work at Buchlyvie, Kilsyth, Campsie Glen, Strathblane, and Aberfoyle; D. G. Murray of Aberfoyle has been awarded the contract for Gartmore; and for the cleaning and repainting of Port of Menteith, Blanehead, and Balfron the firm of Craig has been given the contract. T. Armour Limited of Airdrie is performing the work at Gartness, Dumgoyne, Killearn, and Gargunnock.

Bus Workers' Wages.—At the hearing on July 14 before the Industrial Court of a claim against the United Counties Omnibus Co. Ltd. for improved rates and conditions, Mr. Harold Clay (Transport Workers' Union) said that an undertaking that could maintain over a period of years a dividend of not less than 10 per cent. on its ordinary shares could afford to pay the wage rates claimed before the court. This was not a demand for increased wages

but for the restoration of payments that should never have been taken away. The United Counties is not a railway-associated undertaking, but is a subsidiary of Thomas Tilling Limited.

Rock Island Reorganisation Plan.—The Chicago Rock Island & Pacific Railway Company has filed a reorganisation plan which would reduce the fixed charges from \$14,335,000 to \$2,500,000 annually, principally by creating a general mortgage carrying a 4 per cent. interest on a non-cumulative income bond basis.

Institute of Patentees.—This Institute is organising the Twelfth International Exhibition of Inventions, to take place in the Central Hall, Westminster, London, from September 30 to October 10, inclusive; and the Northern Exhibition of Inventions, to be held in the St. George's Drill Hall, Newcastle-upon-Tyne, from November 25 to December 5.

Simms Motor Units New Address.—Simms Motor Units Limited announces that the company's head office address has been changed from Gresse Street, W.1, to Oak Lane, East Finchley, N.2; telephone Finchley 2262; telegrams Simotunit, Eastfinch, London. The Gresse Street address is being retained for service and spare parts, but all correspondence should be addressed to the new head office.

Pre-Cast Concrete Flags.—The British Standard Specification for concrete flags was first issued in 1929. As a result of experience gained in its use over a period of years, it has now been found possible to issue a revised specification containing a number of improvements. Copies (B.S.S. No. 368-1936) may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

Level Crossing Accidents in U.S.A.—A report just issued by the Interstate Commerce Commission gives the total number of accidents at level crossings in the U.S.A. during 1935 as 3,514, of which almost 90 per cent. involved motor vehicles. There were 1,372 accidents caused by motor vehicles running into trains, 444 occurring at crossings protected by a watchman or safety devices. In 264 cases the trains were stationary. The report shows that 75 per cent. of the accidents involving motor vehicles occurred at night, the majority between 11 p.m. and 12 p.m. In 266 cases when motor vehicles struck trains signals indicating the presence of a train were operating; in 155 cases a watchman was on duty; and in 23 cases the gates were closed to road traffic.

Institute of Transport Examinations, 1937.—The next examinations for graduateship and associate membership of the Institute of Transport will be held on April 29, 30, and May 1, 1937, in London, and at a number of provincial and overseas centres. Full

particulars of the examinations, previous question papers (price 1s. a set, post free) and copies of a revised and enlarged edition of a booklet entitled "The Institute of Transport Examinations: notes for the guidance of candidates unable to attend preparatory courses" (price 2s. 6d., post free) may be had on application to the Secretary, the Institute of Transport, 15, Savoy Street, W.C.2. The closing date for the receipt of applications to sit for the examinations is March 1, 1937. Prospective candidates are advised to confirm their eligibility to sit for the examinations they have in view, and this they may do by communicating with the Secretary of the Institute.

Congo Railways in 1935.—For the year 1935 the C. de fer du Bas-Congo, comprising the Port Francqui-Bukama and Tenke-Dilolo lines owned by the Leopoldville-Katanga Dilolo Railway Company, carried 15,839 passengers, an increase of 10 per cent. on the figure for 1934. The average journey was 380 km. The revenue-earning freight traffic in-

creased by 20 per cent. to 182,356 tonnes, and the trailing tonne-km. were 144,742,671. On the Katanga Railway, running from Bukama to the Rhodesian frontier, the number of passengers carried was 29,315, an increase of 9.8 per cent. The revenue-earning freight traffic was 1,313,455 tonnes, a decrease of 2.1 per cent., but the trailing tonne-km. increased by 1.5 per cent. to 146,945,802.

Road Accidents.—The Ministry of Transport return for the week ended July 11 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

	Killed, including deaths resulting from previous accidents		Injured	
England	91	(105)	4,770	(4,770)
Wales	7	(6)	206	(227)
Scotland	12	(15)	515	(549)
	110	(126)	5,491	(5,546)

The total fatalities for the previous week were 137, compared with 119 for the corresponding period of last year.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 28th Week			Totals to Date		
	1936	1935	Inc. or Dec.	1936	1935	Inc. or Dec.
L.M.S.R. (6,917 mls.)	£	£	£	£	£	£
Passenger-train traffic...	601,000	656,000	- 55,000	12,627,000	12,585,000	+ 42,000
Merchandise, &c. ...	474,000	451,000	+ 23,000	13,233,000	12,501,000	+ 732,000
Coal and coke ...	209,000	179,000	+ 30,000	6,819,000	6,539,000	+ 280,000
Goods-train traffic ...	683,000	630,000	+ 53,000	20,052,000	19,040,000	+ 1,012,000
Total receipts ...	1,284,000	1,286,000	- 2,000	32,679,000	31,625,000	+ 1,054,000
L.N.E.R. (6,332 mls.)	398,000	414,000	- 16,000	8,207,000	8,195,000	+ 12,000
Passenger-train traffic...	313,000	305,000	+ 8,000	8,969,000	8,650,000	+ 319,000
Merchandise, &c. ...	225,000	197,000	+ 28,000	6,537,000	6,254,000	+ 283,000
Coal and coke ...	538,000	502,000	+ 36,000	15,506,000	14,904,000	+ 602,000
Goods-train traffic ...	936,000	916,000	+ 20,000	23,713,000	23,099,000	+ 614,000
Total receipts ...	936,000	916,000	+ 20,000	23,713,000	23,099,000	+ 614,000
G.W.R. (3,746½ mls.)	263,000	269,000	- 6,000	5,251,000	5,235,000	+ 16,000
Passenger-train traffic...	189,000	190,000	- 1,000	5,241,000	5,038,000	+ 203,000
Merchandise, &c. ...	91,000	94,000	- 3,000	2,829,000	2,783,000	+ 46,000
Coal and coke ...	280,000	284,000	- 4,000	8,070,000	7,821,000	+ 249,000
Goods-train traffic ...	543,000	553,000	- 10,000	13,321,000	13,056,000	+ 265,000
Total receipts ...	543,000	553,000	- 10,000	13,321,000	13,056,000	+ 265,000
S.R. (2,154 mls.)	369,000	372,000	- 3,000	7,882,000	7,839,000	+ 43,000
Passenger-train traffic...	62,500	63,000	- 500	1,710,500	1,700,500	+ 10,000
Merchandise, &c. ...	25,500	24,000	+ 1,500	887,500	833,500	+ 54,000
Coal and coke ...	88,000	87,000	+ 1,000	2,598,000	2,534,000	+ 64,000
Goods-train traffic ...	457,000	459,000	- 2,000	10,480,000	10,373,000	+ 107,000
Total receipts ...	457,000	459,000	- 2,000	10,480,000	10,373,000	+ 107,000
Liverpool Overhead ... (6½ mls.)	1,281	1,259	+ 22	32,412	32,277	+ 135
Mersey (4½ mls.)	3,928	3,987	- 59	112,994	111,927	+ 1,067
*London Passenger Transport Board ...	562,400	553,900	+ 8,500	1,138,200	1,120,000	+ 18,200
IRELAND						
Belfast & C.D. (80 mls.)	3,792	5,624	- 1,832	61,924	63,895	- 1,971
" " goods	624	569	+ 55	15,497	13,914	+ 1,583
" " total	4,416	6,193	- 1,777	77,421	77,809	- 388
†Great Northern (543 mls.)	14,700	17,500	- 2,800	252,900	248,950	+ 3,950
" " goods	9,050	9,750	- 700	260,950	249,650	+ 11,300
" " total	23,750	27,250	- 3,500	513,850	498,600	+ 15,250
†Great Southern (2,076 mls.)	45,729	46,025	- 296	863,051	848,402	+ 14,649
" " goods	38,031	35,203	+ 2,828	1,100,632	1,041,035	+ 59,597
" " total	83,760	81,228	+ 2,532	1,963,683	1,889,437	+ 74,246

* 2nd week.

† 27th week.

British and Irish Railways Stocks and Shares

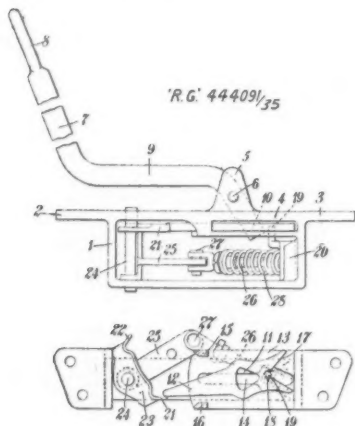
Stocks	Highest 1935	Lowest 1935	July 15, 1936	Rise/Fall
G.W.R.				
Cons. Ord. ...	55½	44½	48	+1½
5% Con. Prefce. ...	124	108	119	+1
5% Red. Pref. (1950) ...	117	106½	111½	—
4% Deb. ...	118½	108	112	+1½
4½% Deb. ...	122	110	116½	—
4½% Deb. ...	129½	118	122½	—
5% Deb. ...	140½	130	136½	—
2½% Deb. ...	82½	68½	76	—
5% Rt. Charge ...	137	128	132	—
5% Cons. Guar. ...	136½	120½	132	—
L.M.S.R.				
Ord. ...	25½	16	24	+1
4% Prefce. (1923) ...	58½	43½	72	+1½
4% Prefce. ...	87½	73½	88	+2
5% Red. Pref. (1955) ...	107	97½	107½	—
4% Deb. ...	110½	99½	106½	—
5% Red. Deb. (1952) ...	119½	111½	116½	—
4% Guar. ...	105½	95½	103	—
L.N.E.R.				
5% Pref. Ord. ...	157½	8½	10½	+1½
Def. Ord. ...	79½	4½	5½	+1½
4% First Prefce. ...	74½	48	68	+1
4% Second Prefce. ...	31½	16½	25	+1½
5% Red. Pref. (1955) ...	92½	71	92½	—
4% First Guar. ...	103½	93	100	—
4% Second Guar. ...	98½	82½	94	—
3% Deb. ...	86	75	82	—
4% Deb. ...	109½	98½	105½	—
5% Red. Deb. (1947) ...	118½	106½	111½	—
4½% Sinking Fund Red. Deb. ...	112½	108	109	—
SOUTHERN				
Pref. Ord. ...	87½	69½	91	—
Def. Ord. ...	25½	16½	22	+1½
5% Prefce. ...	124	108½	120½	+1½
5% Red. Pref. (1964) ...	117½	109½	118½	—
5% Guar. Prefce. ...	136½	121½	131½	—
5% Red. Guar. Pref. (1957) ...	121½	112½	119½	—
4% Deb. ...	116½	107	111	+1
5% Deb. ...	138	130½	135½	—
4% Red. Deb. 1962-67 ...	115	106½	111	—
BELFAST & C.D.				
Ord. ...	9	4	6	—
FORTH BRIDGE				
4% Deb. ...	111½	104½	104½	—
4% Guar. ...	109½	104	104½	—
G. NORTHERN (IRELAND)				
Ord. ...	20	7	16½	—
G. SOUTHERN (IRELAND)				
Ord. ...	57½	14½	59½	—
Prefce. ...	50	25½	60	—
Guar. ...	88½	51½	85	—
Deb. ...	86½	70	91	-1½
L.P.T.B.				
4½% "A" ...	130	119½	122½	—
5% "A" ...	139½	130	133½	—
4½% "T.F.A." ...	113½	108	109	—
5% "B" ...	131½	122½	128½	—
"C" ...	109½	91	105	-1
MERSEY				
Ord. ...	23½	9½	24½	—
4% Perp. Deb. ...	100½	93½	99½	—
3% Perp. Deb. ...	75½	67	76	—
3% Perp. Prefce. ...	62	47½	64½	—

ABSTRACTS OF RECENT PATENTS*

No. 444,091. Improvements in Two-Way Self-Reversing Lever Mechanism for Operating the Points of Railway Switches

Llewelyn Wynn - Williams, B.Sc.,
Houghton Bridge Works, Darlington,
County of Durham. March 22, 1935.

The casing or box 1 of the switch operating mechanism has flanges 2, 3, by which it is secured to the sleepers. The top wall 4 of the casing is provided with an upstanding bracket 5 in which is mounted the fulcrum pin 6



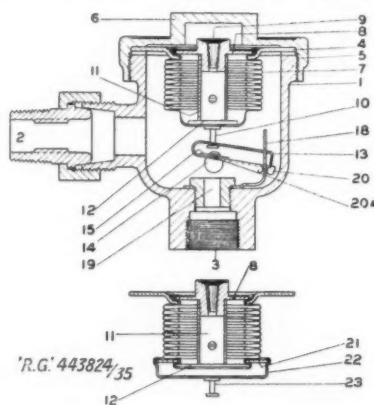
for the hand lever. The latter is provided with three main portions, namely, an upstanding portion 7, to the upper extremity of which is secured the hand grip 8; a horizontal portion 9, and a downwardly extending portion 10 which engages within an opening 11 formed in the plunger member 12. Immediately beneath the plunger member 12 is the plate 13, which is provided with a slot 14 for the reception and guidance of the lower extremity of the lever, and stops 15, 16, for limiting the degree of lateral movement of the forward end of the plunger 12. The plunger has a flaring rear end 17 cut away to form a V, the apex of which is provided with a recess or slot 18 adapted to receive a controlling pin 19 formed on the pivot block 20. The forward end of the plunger member 12 tapers, and engages with one or other of the abutments 21, 22 on the crank block 23 which is mounted on the spindle 24. The crank block is provided with an arm 25 which forms one link of a spring toggle mechanism, a telescopic arm 26 which is connected therewith at 27, and the spring 28 which engages about the telescopic arm 26. The operation of the device is as follows:—The hand grip 8 is swung from left to right, whereupon co-operation of the portion 10 of the

lever with the plunger member 12 causes the latter to move from right to left, and by engagement with the abutment 21 on the crank block 23 to oscillate the crank block in a clockwise direction into a position in which the forward end bears against the abutment 22 in readiness for the next operation of the mechanism.—(Accepted March 13, 1936.)

No. 443,824. Steam Traps

Bernard Theodore Wingfield,
"Brooklyn," The Green, West
Drayton, Middlesex. (Accepted August
13, 1935.)

A steam trap of the thermal expansion type, in which the expansion or contraction of a bellows filled with volatile liquid responsive to temperature changes has a body 1 provided with inlet 2 and outlet 3. A ring 4 carries a thermal element 7 seated on a machined surface 5. The thermal element consists of the bellows 7, closed at the top by an end plate and having a filling opening 9 for the liquid. The ring 4 is introduced between two folds of the bellows during the process of formation. A button 10 is attached to the outside of the bellows. At 11 is a stop attached to the plate limiting the travel of the bellows, a washer 12 being provided to support the closed bottom end. An arm 13 having a slot with an enlarged groove has the button 10 secured to it. By means of a clip 15, a spherically ground valve 14 is secured to the lower side of the arm 13. At the other end of the arm 13 radiused ears 20, 20a are formed to act as guides



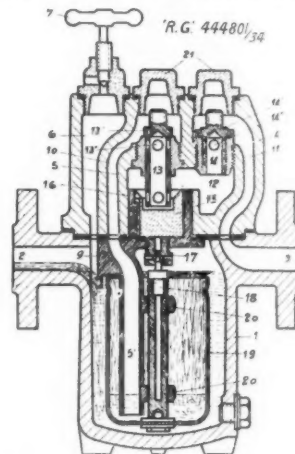
on a bracket 18, which is fixed in position between valve body 1 and valve seat 19, and has a slot in which the arm 13 is free to slide. A method of protecting the soldered joint at the bottom of the bellows for use in connection with bellows open at both ends

consists of a ring 21 which is fixed during formation of the bellows in a manner similar to the ring 4, the cap 22 being subsequently secured to the disc 21, the cap 22 also carrying the button 23 which corresponds to the button 10 previously mentioned.—(Accepted March 6, 1936.)

No. 444,801. Steam Traps

Philippe Walter of 10, Boulevard de la Victoire, Strasbourg (Dept. Bas-Rhin), France. (Convention date: October 26, 1934.)

A steam trap comprises three essential parts:—a lower receiver 1 of pot form with an inlet pipe 2 and an outlet pipe 3; a head 4 serving as a cover



for the receiver 1; and an intermediate part 5 located in the head 4. In the head 4 there is provided a chamber 6 for the separated air, which chamber is closed by an evacuating valve 7 operated either by hand or by an automatic valve 8. In the head 4 there are also provided two passages 10 and 11 separated from one another by intermediate walls, as well as a chamber 12. A valve 13 regulates the communication from the passage 10 to the chamber 12, and the valve 14 regulates the communication of the chamber 12 with the passage 1. The valves 13 and 14 have cylindrical sides and enlarged head portions 13 ft., 14 ft., seating against a valve seat in the guiding sleeve. Ports 13 in., 14 in., in the walls of the slides permit the passage of the condensed water. Access may be gained to the valves by unscrewing the plugs 21. Below the sliding valve 13 there is located the motive piston 15, which is provided with a safety exhaust passage 16, which extends from the base of the piston and opens in the lateral wall thereof. The sliding valve 13 enters the recess in the upper part of the piston 15 and is raised by the latter to uncover the upper ports 13 in. Below the piston there opens a valve body 17 with which a pin valve 18, for controlling the orifice, co-operates. This pin valve is connected to a bucket float 19 and is guided by rings 20 connected to the tubular extension 5 ft., which is con-

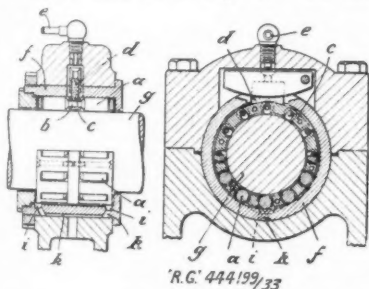
* These abridgments of recently published specifications are specially compiled for THE RAILWAY GAZETTE by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2 either sheet by sheet as issued, on payment of a subscription of 5s. a group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address price 1s. each

nected with the passage 10. For steam installations the trap acts as follows:—Air, steam and condensed water enter the receiver 1 through the tube 2, striking against the wall 9 and being separated so that the gaseous fluids rise in the chamber 6 while the condensed water falls into the receiver 1 and produces the lifting of the float 19 and the closing of the valve body 17 by the pin valve 18. At first only the air contained in the steam installation enters the trap and escapes by the evacuation valve which is opened. As soon as this valve permits steam to escape, it is closed. The condensed water then rises in the receiver until it overflows into the interior of the float over the upper edge of this latter. The float thus becomes heavy and finally falls, thus opening the valve 17. Steam entering through this valve then lifts the piston 15 until the safety passage 16 permits steam to enter the chamber 12. At the same time the cylindrical slide valve is raised by the piston and opens. The pressure of the steam in the trap discharges the contained water which passes upwardly through the tubular part 5 ft. and into the passage 10 from whence it enters the chamber 12, lifts the valve 14 and leaves by the passage 11 and the pipe 3. As soon as the float 19 is emptied it rises. The valve 17 is thus closed and the trap commences to fill again. At the same time the piston 15 and the two valves 13, 14 return to their closing position on the one hand by reason of their own weight and on the other hand by reason of the pressure acting thereon.—(Accepted March 27, 1936.)

No. 444,199. Lubrication of High-Speed Anti-Friction Bearings

Hermann Hahn, Oskar Hahn, and Karl Tessky, of Indexwerke, Hahn & Kolb Esslingen-am-Neckar, Germany. (Convention date: September 15, 1933.)

In an arrangement for lubricating high-speed roller bearings, the rollers *a* have a constriction *b* in the middle and are held in a cage *c*. On the



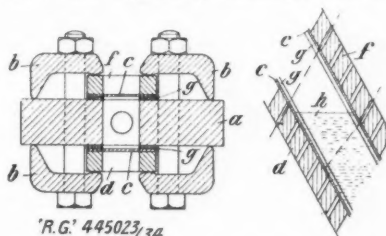
periphery of the cage *c* at its middle point is a lubricating felt *d* to which a drop of oil is supplied from a lubricator through the pipe *e*, say every half-hour or still less often. The felt *d* distributes the oil on the periphery of the cage *c*, and thence it reaches the running surface of the outer ring *f*, the rollers *a*, and the surfaces of the

cage touched by them as well as the inner running surface, in this instance formed by the periphery of the shaft *g*. At the side opposite to that at which the lubricating oil is supplied, an obtuse-angled oil groove *h* is provided on the bearing in the inner bearing surface of the outer ring *f*, in such a position that the oil reaching that place is stripped off outwards, in order to flow away through recesses *i* and passages *k* to any other places requiring lubrication. In this way the lubricant supplied periodically, is removed from the bearing in quite a short time after its introduction, so that there is left only the oil-film necessary for lubrication, but which does not produce additional heating.—(Accepted March 16, 1936.)

No. 445,023. Liquid Level Gauges for Steam Boilers

Martin Vermöhlen of No. 62, Bachstrasse, Aachen, Germany. (Convention date: December 14, 1934.)

In a water level gauge arranged in the inclined position, *a* is the housing or body member of the gauge. At *b* are clamping plates by which thin mica sheets *c* and metallic grates *d* and *f* having alternate webs and slots are held on the sight openings at the front and rear face of the housing *a*. At *g* are tightening packings, and *h*



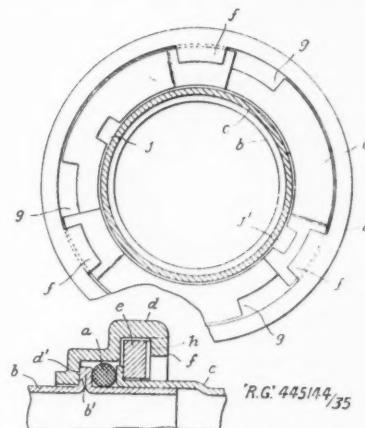
designates the water in the gauge. The light falling through the slots of the rear grate *f* into the steam space is not deflected by the mica sheets, and therefore passes linearly through the steam space and through the slots of the front grate *d* to the outside, so that the steam space appears bright to an observer standing within the path of the rays. The light falling on the water is, however, deflected upwards according to optical laws, so that it strikes on the webs of the front grate, which is adjusted correspondingly. By displacing the grates relative to each other, a reverse effect may be obtained.—(Accepted April 1, 1936.)

No. 445,144. Improvements in Pipe Joints

British Mannesmann Tube Co. Ltd., of Corporation Road, Newport, and Werner Albert, of Richmond Villas, Swansea, Glamorgan. (April 17, 1935.)

A pipe joint for pipes having outwardly extending flanges comprises a joint ring *a* housed between the flanged end portions of two pipe lengths *b* and *c*. A housing *d* has a part *d'* that bears against the part *b'*

of the pipe *b*, and the housing also surrounds the ring *a* and the flanged end of the pipe *c*. The housing *d* also encloses a space in which a locking cam *e* is retained by means of lugs *f* on the housing. The cam ring is provided with slots *g* for the passage of the lugs *f* when the joint is being assembled. These lugs slide over helical surfaces or inclined planes *h*, if the



cam ring *e* is rotated by a key inserted in a slot *j* or *j'*. If this rotary movement is effected, the flanges on the pipe ends will be drawn together and the joint ring *a* will be compressed.—(Accepted April 3, 1936.)

COMPLETE SPECIFICATIONS ACCEPTED

- 443,433. Betheder, F. F. Shock-absorbing attachments for vehicle springs.
- 443,448. Levy, R. L. Hydraulic control device for brakes of railway vehicles and for like purposes.
- 443,783. Manbre, G. Gland boxes or the like.
- 443,867. Thode, A. Brake block with interchangeable brake surface.
- 443,943. Hocke, E., and Zarlatti, F. Diesel type locomotives.
- 443,966. Simmons, A. W., and Westinghouse Brake & Signal Co. Ltd. Fluid-pressure braking apparatus.
- 444,048. Deutsche Werke Keil A.G. Electrically-controlled warning-signal installations for railway crossings.
- 444,202. Kahn, Dr. M. Railway wheels.
- 444,513. Budd Manufacturing Company, E. G. Railway vehicle bodies.
- 444,524. Automobile Ventilation, Inc. Window-ventilating mechanism for vehicles.
- 444,734. La Celle, A. de. Locking nuts.
- 444,857. Tross, A. Stay bolts for locomotive fireboxes and the like.
- 445,124. Taylor, G. R. T. Wheels of railway rolling-stock and other solid revolving bodies having a characteristic ring.
- 445,290. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Process for the manufacture of mineral lubricating-oils.
- 445,340. Clarke, C. V. Braking mechanism.
- 445,368. Tansley, G. E. Feedwater heaters of the economiser type.

CONTRACTS AND TENDERS

Diesel-Electric Shunting Locomotives for S.R.

The English Electric Co. Ltd. has received an order for three diesel-electric equipments for shunting locomotives from the Southern Railway. These locomotives will be generally similar to those in service on the L.M.S.R. and G.W.R., and will be equipped with 350 b.h.p. six-cylinder English Electric diesel engines and standard two-motor electrical equipment with torque control. The locomotive frames, wheels and axles will be designed and built by the railway company, and the complete locomotives assembled and tested by the English Electric Co. Ltd. at its Preston works.

More L.N.E.R. Wagon Orders

The final allocations of the L.N.E.R. orders for wagons, the first two allotments of which have been announced exclusively in the last two issues of THE RAILWAY GAZETTE, are, it is understood, as follow:—

Hurst Nelson & Co. Ltd., 500 20-ton hopper wagons and 200 12-ton open goods wagons.

Head Wrightson & Co. Ltd., 500 20-ton hopper wagons.

Cowans Sheldon & Co. Ltd. has received an order from the L.N.E.R. for a new 70-ft. turntable to be installed at Norwich Thorpe. This turntable will be capable of turning the largest L.N.E.R. locomotives.

H. Lees & Co. Ltd. has received a contract from the L.N.E.R. for the electrification of the new coaling plant to be installed at Colwich locomotive depot, Nottingham, which is in course of modernisation. The new coaling plant will be electrically operated and have a capacity of 500 tons.

Ransomes & Rapier Limited has received an order from the Indian Stores Department for two electrically-operated traversers at a total price of Rs. 66,774 c.i.f. Karachi.

J. O'Hara Murray & Co. (India) Ltd. has received an order from the Indian Stores Department for 500 side buffers at total price of Rs. 20,573 c.i.f. Karachi.

Stewarts and Lloyds Limited has received an order from the Central Argentine Railway for 2,900 acid-resisting solid-drawn steel boiler tubes.

The Madras & Southern Mahratta Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton, with the Steel Company of Scotland, for eight crank axles and with the Société Commerciale d'Ougree for 10,000 bearing plates, 8 in. by 6½ in. punched for ¾ in. square dogspikes.

The Bombay, Baroda & Central India Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton with Société Trefleries a Laminiers du Havre for 11 copper firebox plates and

with S.A. de Usines de Cuivre et a Zinc de Liege for 27 copper firebox plates.

Diesel Units for the San Paulo Railway

Walker Bros. (Wigan) Ltd. has received an order, to the inspection of Messrs. Fox & Mayo, from the San Paulo Railway for two C-type 100 h.p. standard uni-directional self-contained Walker isolated and detachable diesel power-bogie units, complete with cabs, underframes, trailing bogies and all necessary controls. One unit is for the Bragantina Railway metre gauge line, and the other for the San Paulo Railway 5 ft. 3 in. gauge line. The bodies for these cars will be constructed and fitted in Brazil by the railway company.

The South African Railways and Harbours Stores Department is calling for tenders for two 20,000 gall. and one 42,000 gall. pressed steel tanks complete with stands and fittings, and also one tank stand 32 ft. high complete with ladder. Further details may be obtained upon application to the Department of Overseas Trade.

Wagons for Construction in India

Tenders, receivable by July 31, are invited by the Bengal & North Western Railway and Rohilkund & Kumaon Railway, respectively, for the construction in India and delivery by February 28, 1937, of 400 and for 40 metre-gauge low-sided wagons, I.R.C.A. type M.C.3.

Locomotive Boilers Required

The Stores Purchase Committee, Government of Mysore, Bangalore, invites tenders, through Messrs. Rendel, Palmer & Tritton, 55, Broadway, Westminster, S.W.1, receivable by September 14, for two metre-gauge HPS class locomotive boilers required by the Mysore Railways during 1936-7.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), Simla, invites tenders, receivable by August 1, for 175,000 m.s. keys for 85-lb. and 88½-lb. B.H. rails and C.I. chairs for East Indian Railway; receivable by August 5, for 60 steel tyres, 3 ft. 9 in. dia., for N.W.R.; and

receivable by August 20, for one electrically-driven journal turning and burnishing and wheel boss facing machine for Lillooah, E.I.R., one electrically-driven machine of similar type for the wagon repair shop at Ondal, E.I.R., and one electrically-driven combined splitting, shear, and punching machine and bar, angle, and tee bevel cropper for the wagon repair shop at Ondal, E.I.R.

Jessop & Co. Ltd. has received an order from the Indian Stores Department for five overhead electric travelling cranes at a total price of Rs. 81,122 f.o.r. Dum Dum.

Howell & Co., Ltd. has received an order from the Central Argentine Railway for 550 Aquadiox zincd solid-drawn steel boiler tubes.

R. Y. Pickering & Co. Ltd. has received an order for one 40 ft. bogie carriage underframe complete with wheels and axles for the Jodhpur Railway, and to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Guest, Keen, Williams Limited has received orders from the Indian Stores Department for 20 sets of turnouts and switches at a total price of Rs. 43,970 f.o.r. Shalimar, and Burn & Co. Ltd. has also received an order for 20 sets of turnouts and switches at a total price of Rs. 45,300 f.o.r.

The Bengal-Nagpur Railway is prepared to receive tenders for 14 H.S.M. class boilers.

The Bengal & North-Western Railway is prepared to receive tenders for six P class locomotive boilers.

The Chinese Government Purchasing Commission is prepared to receive tenders for steel boiler tubes and copper ferrules and laminated and coil springs.

The Agent, Great Indian Peninsula Railway, invites tenders, receivable by August 12, for the supply of cylinders required for H/4 type locomotives.

The South African Railways and Harbours Administration is calling for tenders for quantities of die pressed brake lining in moulded pieces, rolled brake lining in lengths and die pressed plate clutch lining, required for road vehicles. Further information may be obtained from the Department of Overseas Trade.

Exports of Railway Material from the U.K. in June

	Six Months Ending			
	June, 1936	June, 1935	June, 1936	June, 1935
Locomotives, rail	169,183	21,654	810,493	294,682
Carriages and wagons	58,758	77,926	763,410	537,781
Rails, steel	192,302	56,535	563,235	321,125
Wheels, sleepers, fishplates and miscellaneous materials	59,309	196,645	400,090	801,837
Locomotive and rail exports included the following:—				
	Locomotives		Rails	
	June, 1936	June, 1935	June 1936	June, 1935
Argentina	—	—	576	5,806
Union of South Africa	—	—	122,302	51,384
British India	8,763	12,422	6,497	33,442

OFFICIAL NOTICES

WANTED.—Diesel Traction Supplement, *THE RAILWAY GAZETTE*, 22nd March, 1935, and Electric Traction Supplement, 8th March, 1935, and 28th June, 1935. Also bound volumes Locomotive Magazine.—Write ADAMS, 20, Colebrook Croft, Shirley, Birmingham.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 35, Tothill Street, Westminster, London, S.W.1.

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Viceroy Opens Indian Transport Advisory Council Meeting

A Reuters message from Simla says the new Viceroy, the Marquess of Linlithgow, who possesses expert knowledge and experience of problems connected with rail and road transport, especially in so far as they concern agricultural marketing, delivered a brief address before opening the Transport Advisory Council on July 13. He eloquently stressed the following important points: "It is beyond dispute," he said, "that the great contribution which railways throughout the world have rendered to economic develop-

ment has depended to a great degree upon the system of rate making based, not upon the cost of the service rendered, but upon what traffic can bear. Thereby a profitable outlet has been found for a variety of commodities, which are unable to bear freights appropriate to an invariable system of rate-fixing. The nature of the threat offered to this system," continued the Viceroy, "by road traffic, arises from the tendency of those commodities capable of bearing higher charges to gravitate towards motor-lorry trans-

port. If this tendency is allowed to develop in an uncontrolled manner, a considerable portion of the more profitable traffic will eventually be transferred from the railways to the roads. The railways would then be driven to re-cast their system of rates to the detriment of those classes of traffic least able to carry increased charges. "This," concluded the Viceroy, "would lead inevitably to profound disturbances in relative market values and serious dislocation of the whole commercial structure. The effects upon agriculture of such a revolution would be most damaging and would probably be lethal in so far as the selling possibility of certain types of produce is concerned."

Questions in Parliament

Level Crossings

Mr. Parkinson, on July 8, asked the Minister of Transport if he would state the number of level crossings in Lancashire in 1935 and the number of level crossings abolished during the years 1931, 1932, 1933, 1934, and 1935, stating the amount of grants made by his Department towards the costs of such replacements.

Mr. Hore-Belisha.—The number of level crossings in Lancashire in 1935, so far as can be ascertained from the available records, was 253, of which 56 were on classified roads. Three level crossings were abolished or eliminated during the period April 1, 1930, to March 31, 1935, with the aid of grants from the Road Fund amounting to £56,221.

Deaths on Electrified Railways

Mr. Michael Beaumont, no July 15, asked the Minister of Transport, how many deaths from electrocution occurred on the lines of electrified railways in 1935, to ordinary civilians and to people employed on the lines, respectively.

Mr. Hore-Belisha.—Three employees and eight civilians; all the latter were trespassers.

Parliamentary Notes

Progress of Railway Bills

The G.W.R. (Additional Powers) Bill which had been listed for consideration by a Select Committee of the House of Lords became unopposed and was reported, with amendments, on July 8 by the Unopposed Committee. The L.N.E.R. (General Powers) Bill was reported, with amendments, to the House of Lords on July 9 from the Select Committee, and the

L.N.E.R. (London Transport) Bill was reported, with amendments, to that House on July 8 by the Unopposed Committee. The London Passenger Transport Board Bill was reported, with amendments, on July 8 from the Select Committee of the House of Lords. These four Bills are now awaiting third reading in that House.

Royal Assent to Railway Bills

The Royal Assent was given on July 14 to the following among other Acts of 1936: Great Western Railway (Ealing and Shepherd's Bush Railway Extension); London & North Eastern Railway Order Confirmation; London Midland and Scottish Railway; Southern Railway.

Railway and Other Reports

Southdown Motor Services Limited.

—For the year ended March 31, 1936, this company, which is jointly controlled by the Southern Railway Company and Tilling & British Automobile Traction Limited, secured a gross revenue of £897,183, compared with £835,346 in the previous year. After deducting £483,387 (£432,038) for operating and maintenance expenses, £151,548 (£135,244) for Road Act duties, rates, and taxes, £51,137 (£46,336) for administration and general expenses, £116,086 (£98,060) for depreciation, and other items chargeable against revenue, there remains a profit of £84,625 (£113,268), to which must be added £25,969 brought forward, making a total of £110,594, compared with £137,469 for the previous year. Out of this amount it is proposed to place £25,000 (£44,000) to reserve, to pay, as in the previous year, a dividend of

10 per cent. and a bonus of 5 per cent., making a total distribution of £67,500, and to carry forward £18,094.

Central Bahia Railway Trust.

—The trustees have declared for the half-year to July 31, 1936, interest on the A certificates at the rate of £1 9s. per cent. per annum (14s. 6d. per cent. actual), payable on August 1. The payment a year ago was £1 6s. per cent. per annum.

Costa Rica Railway.—The report for the year to June 30, 1936, shows that the total income amounted to £154,613, including the rental of £137,100 received from the Northern Railway Company under the working agreement. Debenture interest and other charges amounted to £104,616, leaving a balance of £49,998. Out of this balance the directors recommend payment of a dividend of 2 per cent. on the capital stock, which will absorb £36,000, leaving £13,998 to be carried forward.

Glyn, Mills & Co.—The 104th statement of assets and liabilities as at June 30, 1936, of this well-established private banking house reveals a sound financial position. The proportion of quickly realisable assets to the deposits of £38,208,958 is over 68 per cent. These assets consist of cash, £5,268,545; balances with other banks and cheques in transit, £1,453,218; money at call and short notice, £8,059,000; bills discounted, £479,542; and investments, £10,550,887, including £9,666,981 British Government securities. Advances to customers, etc., amount to £13,522,765, and bank premises at cost, less amounts written off, stand at £740,000. Total assets are £42,084,144. The total capital authorised and issued is £1,060,000, and the reserve fund stands at £530,000.

Railway Share Market

The Home railway market has shown an all round improvement this week, due to more confident anticipations regarding the wages question and expectations that the forthcoming interim statements will compare favourably with those of a year ago. There was disappointment that the past week's traffics showed an aggregate increase of only £6,000, but the disposition is to take a favourable view of traffic prospects for the rest of the year particularly in the case of the Southern Railway which usually does considerably better in the second half of the year than in the first.

L.N.E.R. first and second preference were higher and more active and the deferred and preferred ordinary show fractional gains on balance for the week. For the past week the railway's traffics increased by £20,000. It is in fact the

only main line railway able to show a gain in traffics on the week. Some £50,000 of the railway's 4 per cent. debenture stock became available in the market this week at 105½, at which the yield is rather more than 3½ per cent. L.M.S. ordinary was good with a rise on the week of 23½ to 24, while the 4 per cent. preference and 1923 preference also moved in favour of holders—but there was an easier tendency when it became known that the past week's traffics showed a decline of £2,000. Great Western ordinary was fairly steady, but is rather lower on balance at 47½, compared with 47½, the traffics for the past week having decreased by £10,000. Southern stocks developed a much better tendency on favourable views of the traffic outlook. The deferred is nearly ½ better on the week at 22, while the preferred recovered

an earlier loss and is unchanged at 91. It is hoped in the market that the half-yearly statement will show that earnings on the deferred stock are running at about ½ per cent. per annum. London Transport "C" stock lost about ½ a point to 105½, there being a tendency to revise dividend estimates downwards in view of the increased wages and other costs that have to be met.

The foreign railway market was idle and without individual features of importance. Argentine railway stocks were influenced by the reaction in the price of wheat. B.A. Gt. Southern reacted and the preference stocks also moved against holders. B.A. Pacific were rather lower at 7 and Argentine Great Western 6 per cent. preference lost nearly two points to 12½. Cordoba Central first debentures were reactionary. Antofagastas developed a rather firmer tendency. There were several strong features among American railroad stocks, but Canadian Pacific ordinary and preference went back moderately.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1935-36	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date			Shares or Stock	Prices					
			Total this year	Inc. or Dec. compared with 1935		Totals		Increase or Decrease		Highest 1935	Lowest 1935	July 15, 1936	Yield (See Note)		
						This Year	Last Year								
South & Central America.															
Antofagasta (Chili) & Bolivia	834	12.7.36	£3,820	—	28	378,560	347,800	+	30,760	Ord. Stk.	23	141½	18	Nil	
Argentine North Eastern ..	753	11.7.36	7,845	—	839	2	12,947	15,286	—	2,339		7	4	31½	Nil
Argentine Transandine ..	—	—	—	—	—	—	—	—	—	A. Deb.	491½	30	47½	87½	Nil
Bolivar ..	174	June, 1936	6,200	+	200	26	41,000	39,400	+	1,600	6 p.c. Deb.	13	5	10	Nil
Brazil ..	—	—	—	—	—	—	—	—	—	Bonds.	14	11	17½	3½	Nil
Buenos Ayres & Pacific ..	2,806	11.7.36	71,827	—	852	2	114,856	142,520	—	27,664	Ord. Stk.	101½	47½	7½	Nil
Buenos Ayres Central ..	190	27.6.36	\$111,700	—	\$5,500	52	\$5,554,400	\$5,776,800	—	\$222,400	Mt. Deb.	21	10	16½	Nil
Buenos Ayres Gt. Southern ..	5,084	11.7.36	105,269	—	2,957	2	168,186	215,163	—	46,977	Ord. Stk.	27	13½	15½	Nil
Buenos Ayres Western ..	1,930	11.7.36	38,173	—	5,364	2	57,681	81,044	—	23,363	"	24	10	12	Nil
Central Argentine ..	3,700	11.7.36	129,382	+	4,253	2	189,080	237,542	—	48,462	"	177½	7	9½	Nil
Do. ..	—	—	—	—	—	—	—	—	—	Dfd.	9	3¼	6½	Nil	
Cent. Uruguay of M. Video ..	273	4.7.36	11,990	+	1,990	1	6,419	7,743	—	1,324	Ord. Stk.	81½	3	4	Nil
Do. Eastern Extn. ..	311	4.7.36	2,382	+	626	1	1,152	1,359	—	207		—	—	—	Nil
Do. Northern Extn. ..	185	4.7.36	1,806	+	541	1	813	1,028	—	215		—	—	—	Nil
Do. Western Extn. ..	211	4.7.36	1,063	+	398	1	520	471	+	49		—	—	—	Nil
Cordoba Central ..	1,218	11.7.36	35,070	—	1,300	2	57,980	70,000	—	12,020	Ord. Inc.	4	1	1½	Nil
Costa Rica ..	188	May, 1936	17,449	+	3,582	48	159,922	176,238	—	16,316	Stk.	35	30	35	51½
Dorada ..	70	June, 1936	13,606	+	1,800	26	79,300	66,800	+	12,500	1 Mt. Db.	103½	102½	102½	57½
Entre Rios ..	810	11.7.36	10,527	—	1,118	2	16,901	22,015	—	5,114	Ord. Stk.	15	61½	8	Nil
Great Western of Brazil ..	1,082	11.7.36	5,100	—	200	28	216,000	222,200	—	6,200	Ord. Sh.	12	5½	1½	Nil
International of Cl. Amer.	794	May, 1936	\$536,930	+	\$39,880	21	\$2,617,600	\$2,260,638	+	\$356,962		—	—	—	Nil
Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	—	1st Pref.	1½	5½	1½	Nil	
La Guaira & Caracas ..	223	June, 1936	4,460	+	545	26	27,340	23,845	+	3,495	Stk.	81½	8	5½	Nil
Leopoldina ..	1,918	11.7.36	20,160	+	1,881	28	477,685	438,213	+	39,472	Ord. Stk.	81½	21½	5	Nil
Mexican ..	483	7.7.36	\$219,300	—	\$23,700	1	\$219,300	\$243,000	—	\$23,700	"	1½	14	5½	Nil
Midland of Uruguay ..	319	June, 1936	7,548	+	1,791	52	86,428	111,833	—	25,405	"	1½	11½	11½	Nil
Nitrate ..	401	30.6.36	5,858	+	449	26	69,650	72,513	—	2,953	Ord. Sh.	64½	42½	24½	Nil
Paraguay Central ..	274	11.7.36	32,579,000	—	\$655,900	2	\$4,218,000	\$3,516,000	+	\$702,000	Pr. Li. Stk.	80½	60	73½	8½
Peruvian Corporation ..	1,059	June, 1936	83,124	+	16,368	52	949,493	764,032	+	185,461	Pref.	105½	67½	11½	Nil
Salvador ..	100	11.7.36	69,815	—	25,135	2	616,443	623,638	—	7,195	Pr. Li. Db.	65	61	40	12½
San Paulo ..	153½	5.7.36	31,050	+	2,439	27	795,035	638,034	+	157,001	Ord. Stk.	80	35	49½	5½
Taltal ..	164	June, 1936	4,220	+	1,345	52	42,725	36,940	+	5,785	Ord. Sh.	111½	11½	7½	11½
United of Havana ..	1,353	11.7.36	15,693	—	4,711	2	25,319	36,119	—	10,800	Ord. Stk.	31½	1	2½	Nil
Uruguay Northern ..	73	June, 1936	778	+	154	52	9,922	12,107	—	2,185	Deb. Stk.	41½	21½	4½	Nil
Canada.															
Canadian National ..	23,617	7.7.36	642,422	+	28,112	27	17,734,708	16,642,975	+	1,091,733		—	—	—	—
Canadian Northern ..	—	—	—	+	—	—	—	—	—	4 p.c.	78½	52½	66½	6½	—
Grand Trunk ..	—	—	—	+	—	—	—	—	—	4 p.p. Deb.	1039½	93	101½	31½	—
Canadian Pacific ..	17,237	7.7.36	546,200	+	58,400	27	12,955,200	11,793,600	+	1,161,600	Ord. Stk.	141½	85½	12½	11½
India.															
Assam Bengal ..	1,329	20.6.36	35,977	+	584	12	272,947	263,846	+	9,101	Ord. Stk.	92½	77½	84½	39½
Barsi Light ..	202	20.6.36	2,745	—	682	12	27,825	30,855	—	3,030	Ord. Sh.	105	77½	72½	6½
Bengal & North Western ..	2,112	30.6.36	69,744	+	1,695	13	729,006	705,028	+	23,978	Ord. Stk.	301½	291	307	5½
Bengal Dooars & Extension ..	161	20.6.36	3,418	—	403	12	21,895	25,939	—	1,044	"	127½	122	125½	59½
Bengal-Nagpur ..	3,268	30.6.36	161,250	—	22,453	13	1,611,977	1,704,722	—	92,745	"	105	100½	102½	3½
Bombay, Baroda & Cl. India ..	3,072	10.7.36	195,375	—	6,450	14	2,539,800	2,380,425	+	159,375	"	115½	110	111½	5½
Madras & Southern Mahratta ..	3,229	2.6.36	159,975	+	1,517	12	1,340,475	1,318,432	+	22,043	"	128½	113½	112½	8
Rohilkund & Kumaon ..	561	30.6.36	10,851	—	2,565	13	151,424	141,004	+	10,420	"	294	262	302½	59½
South India ..	2,531	20.6.36	110,784	—	11,774	12	915,178	944,799	—	29,621	"	119½	104½	103½	5½
Various.															
Beira-Umtali ..	204	May, 1936	70,177	+	124	35	513,150	520,214	—	7,064		—	—	—	—
Bilbao River & Cantabrian ..	15	June, 1936	1,397	+	136	26	8,525	9,905	—	1,380		—	—	—	—
Egyptian Delta ..	620	30.6.36	5,883	+	962	13	51,167	46,629	+	4,538	Prf. Sh.	2	15½	13½	51½
Great Southern of Spain ..	104	4.7.36	1,063	—	35	27	29,521	49,687	—	20,166	Inc. Deb.	3½	2	3½	Nil
Kenya & Uganda ..	1,625	May, 1936	238,820	+	37,731	22	1,226,510	1,129,621	+	96,889		—	—	—	—
Manila ..	—	—	—	—	—	—	—	—	—	B. Deb.	48	36	42	8½	
Mashonaland ..	913	May, 1936	105,936	—	19,948	35	815,155	945,921	—	130,766	1 Mg. Db.	104½	100	103	4½
Midland of W. Australia ..	277	May, 1936	11,949	—	1,099	48	149,410	147,835	+	1,575	Inc. Deb.	98½	93	93½	5½
Nigerian ..	1,905	23.5.36	23,398	—	2,717	8	249,335	220,920	+	28,415		—	—	—	—
Rhodesia ..	1,538	May, 1936	182,817	—	15,586	35	1,479,847	1,542,173	—	62,326	4 p.c. Db.	105½	101	105	31½
South African ..	13,256	20.6.36	614,341	—	85,117	12	6,713,892	6,219,680	+	494,212		—	—	—	—
Victoria ..	4,728	Dec., 1935	866,985	—	3,320	26	4,826,292	4,751,974	—	74,318		—	—	—	—
Zafra & Huelva ..	112	May, 1936	8,821	—	2,027	22	48,574	55,398	—	6,823		—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1½.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency. The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.